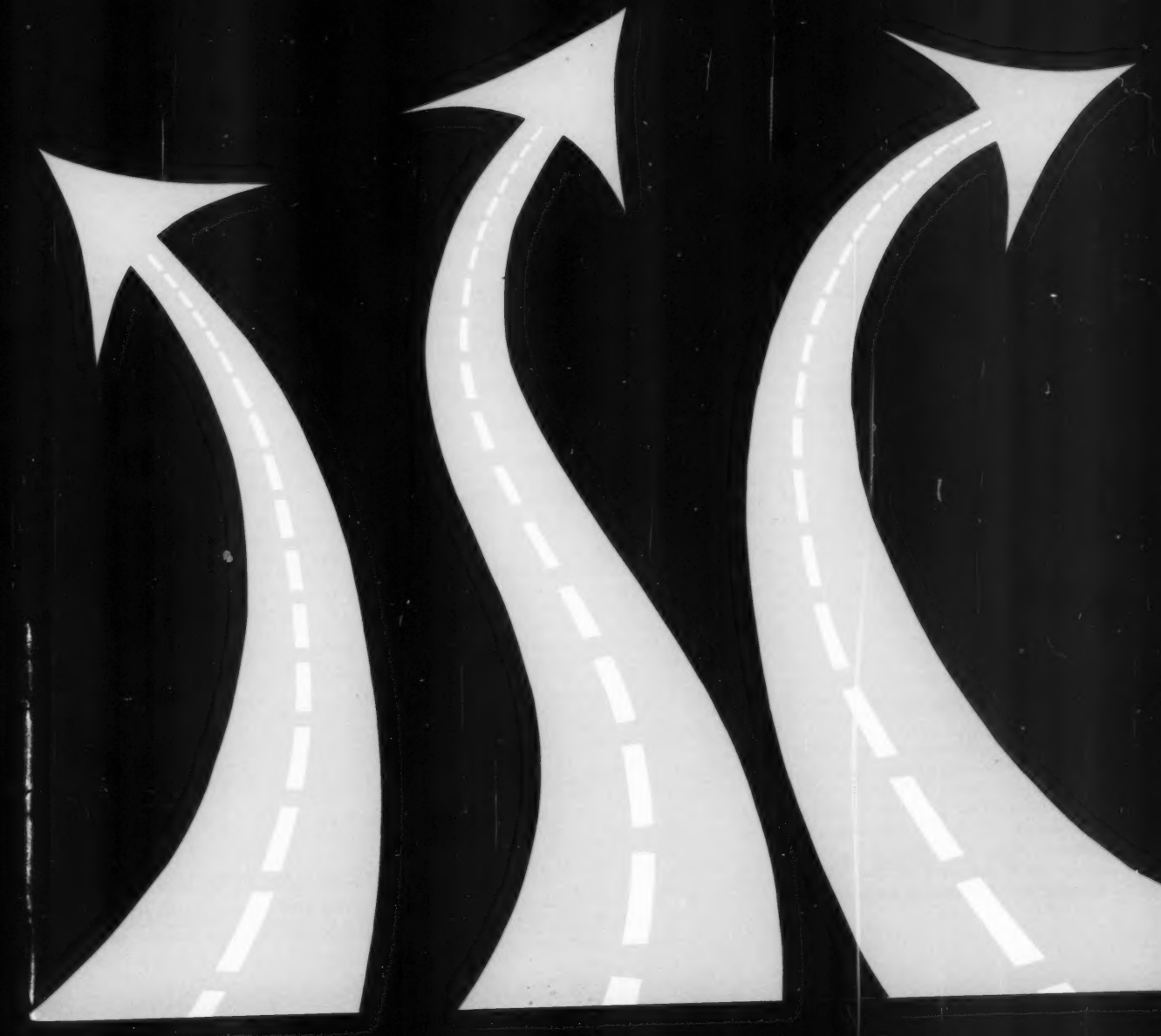
UNITED STATES ARMY

AVIATION DIGEST

FEBRUARY 1973



UNITED STATES ARMY AVIATION DIGEST

FEBRUARY 1973 VOLUME 19 NUMBER 2

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ABOUT THE COVER

What path will the annual writ take? BG William J. Maddox Jr., Director of Army Aviation, and LTC William H. Gardner discuss the matter in depth beginning on page 2. Also, MAJ Paul G. Larish gives us a preview of the 1973 annual writ beginning on page 24

The mission of the U. S. ARMY AVIATION DIGEST is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine, and other related data.

The DIGEST is an official Department of the Army periodical published monthly under the supervision of the Commandant, U. S. Army Aviation School. Views expressed herein are not necessarily those of Department of the Army or the U. S. Army Aviation School. Photos are U. S. Army unless otherwise specified. Material may be reprinted provided credit is given to the DIGEST and to the author, unless otherwise indicated.

Articles, photos, and items of interest on Army aviation are invited. Direct communication is authorized to: Editor, U. S. Army Aviation Digest, Fort Rucker, Al 36360.

This publication has been approved by Headquarters Department of the Army, 1 September 1972.

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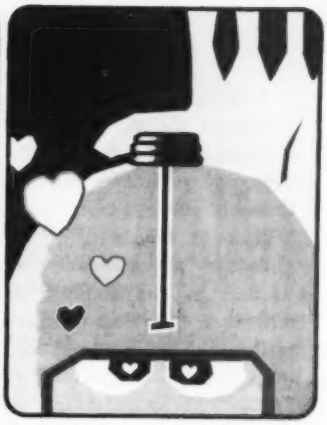
VIEWS FROM READERS



Sir:

I don't agree with your answer to question 18 of the expanded instrument corner in the August 1972 edition.

Paragraph 3-10g (1) specifically authorizes an Army aviator to ignore subsequent ceiling and visibility reports once a straight-in approach has been initiated. (Actually, changes in reported ceiling are somewhat academic in this case because visibility is all one needs to initiate a straight-in approach.) However, the same authorization to ignore subsequent weather reports is not contained in paragraph 3-10g (2) for continuation of a circling approach.

I was taught in the examiner course that this difference in specific authorization means an aviator cannot ignore subsequent reports during a circling approach. Thanks.

MAJ Raymond E. Evans
Command and General Staff College
Room 31, Funston Hall
Fort Leavenworth, KS 66027

• All questions in the subject article were reviewed by the U. S. Army Aeronautical Services Office (USAASO). The reason USAASO concurred with continuing the approach to the missed approach point (circling) is because the protected airspace associated with the missed approach area begins only at the missed approach point (MAP). Reference AR 95-2, paragraph 3-10g (1) and (2) and TERPS, section 7.

Sir:

The School of Operational and Aerospace Medicine is interested in obtaining 100 reprints of the following articles which appeared in the U. S. ARMY AVIATION DIGEST, and would appreciate information as to availability and cost:

a. "Which Way Is Up?—Aeromedic." by Major Bennett G. Owens Jr., M.D., U. S. ARMY AVIATION DIGEST, April 1972, pp. 12-15 (Part 1).

b. "Vestibular Illusions and How to Whip Them—Aeromedic," by Major Bennett G. Owens Jr., M.D., U. S. ARMY AVIATION DIGEST, May 1972, pp. 12-15 & p. 28 (Part 2).

c. Mention is made of a third article. We have misplaced one of the issues of this DIGEST, and it is possible the third part may have been in that issue.

If reprints are not available, we would ask your permission to reproduce these articles for the School of Operational and Aerospace Medicine. This would include a statement as to the original source of the article.

Thank you.

Major J. Soutendam
School of Operational and Aerospace Medicine
Toronto M5N 2E4
Ontario, Canada

• The DIGEST is unable to obtain the reprints you asked for. However, we are happy to grant you the permission to reprint the articles yourself. The third article you mentioned is "Visual Illusions—Aeromedic" which appeared in the June 1972 issue. A copy of this issue is on the way.

Sir:

I read with interest the article in your October issue written by LTC Donald R. Hull, "The Way of the Future: Low Level."

I am the Canadian Army Forces representative on the Joint, U. S. Army, German Army and Canadian Forces Europe, Evaluation Group. We have spent the past 2 years conducting trials on helicopter operations in Europe. The results of the first two trials appear in the following reports:

USAREUR/7th Army Cavalry Troop Evaluation (1970)
AH-1G (Cobra) Follow-On Evaluation (Joint) (1971)

The third and final evaluation report, Joint Attack Helicopter Instrument Evaluation (1972) should be put on distribution early in 1973. This trial utilized laser direct fire simulators to obtain real time kill assessment and employed OH-58As and AH-1Gs against an aggressor force based on Warsaw Pact tactics and organizations. The objective of the evaluation was to obtain statistics on the survivability of helicopters in the European environment.

LTC Hull has correctly identified the threat in Europe and the requirement to fly at low level. Unfortunately his concept of low level and nap-of-the-earth (NOE) flying is not in keeping with the results we obtained on the above three trials. Flying at 50 feet as he advises in Europe, would not permit helicopters to survive against the tank machine gun (12.7 mm) let alone the ZSU 23-4. The majority of helicopter casualties that occurred on the Instrumented Evaluation were flying or hovering above the trees. All three evaluations emphasized that helicopters must fly at an altitude no greater than 10 feet. I prefer the term contour flying, that is, taking advantage of the nap or contours, trees, buildings, hills, etc., to prevent line of sight observation from the enemy or suspected enemy. The only time a helicopter should fly above the trees is when traversing large forested areas.

This type of flying, of course, places the pilot in the vicinity of wires, which are numerous in Europe. This danger, however, has been overemphasized through the years. The Canadian Armed Forces have been flying NOE, by my definition, on reconnaissance missions in Europe since 1962. To my knowledge only two wire strikes have occurred since that time. Both of them were attributed to pilot error because there was no requirement for them to be NOE at the time. They were both flying much too fast under the conditions, returning from the exercise area. The Chief of the Defense Staff recently congratulated the unit in Europe for 3½ years of accident-free flying. An outstanding record for any unit, but especially for one that spends 90 percent of their flying time at NOE. We flew over 1,200 hours on the

Continued on page 15

The following thought-provoking article, "Whither the Writ," should be of professional interest to all Army aviators, particularly since many of you have provided meaningful input through surveys solicited by the author, LTC William H. Gardner.

As the "prime mover" in developing the 1969 version of the annual writ, LTC Gardner is eminently qualified to assess the current annual writ methodology. In so doing, he has identified major shortcomings that are worthy of consideration, some of which will soon be rectified when revisions of ARs 95-1 and 95-63 are complete.

As a preview of things to come, I'm happy to report that our aviation regulations are being modernized and streamlined to eliminate many of the obsolescent and unnecessary regulatory requirements no longer serving a useful purpose. AR 95-1 will be a consolidation of ARs 95-1 and 2 and provides for some of the concepts that this article recommends. For example, all aviators will be required to take the annual writ, regardless of duty assignment, because we as Army aviators have an obligation to remain as professionally qualified as possible. However, the exam will continue to be administered toward the end of each fiscal year since this provides an excellent opportunity for the unit to conduct a formal ground school and thus impart on an organized basis the necessary instruction prior to administration of the writ. This basic reason for scheduling the writ in May and June still is valid. Of course, instructor pilots still can provide appropriate instruction in conjunction with instrument card renewal and standardization rides. AR 95-63 entitled "Army Aviation Standardization and Instrument Program" encompasses all aspects of VFR/IFR training and qualifications. It is envisioned that the new ARs 95-1 and 63 will tie together our loose ends and enable Army aviation to maintain a posture that is clearly "Above the Best!"

While these new regulations might not make the "best seller list," I encourage maximum readership as it will impact across the full spectrum of aviation operations. Meanwhile, enjoy LTC Gardner's article as I have. Feedback of this nature, originating from aviators in the field, provides the realistic, timely input so vital to decision making at the Department of the Army.

Brigadier General William J. Maddox Jr.
Director of Army Aviation

This article is a condensation of the author's treatise written in connection with the communicative arts program at the 1971-1972 Command and General Staff College (CGSC). The treatise discusses the background of the annual writ (drawing on the author's experience as the author of the 1969 version); researches the aviation written examinations of the Army's sister services; and analyzes in depth a survey regarding the future of the writ completed by 171 field grade aviators in attendance at CGSC as well as 50 senior warrant officers then enrolled in Aviation Warrant Officer Intermediate Course (AWOIC) 72-1 at the U. S. Army Aviation School, Ft. Rucker, AL. The article follows this same general format but covers only the major recommendations and conclusions reached in the treatise

Lieutenant Colonel William H. Gardner

IT IS ALMOST axiomatic that when one changes an aspect of a system radically, he should also fully investigate the impact of the change on other components of the system.

The Army aviation system recently has undergone significant changes. Coincident with the drawdown in the Republic of Vietnam, the Army has shifted future emphasis almost entirely to rotary wing operations and to meet financial constraints flight excusal has been implemented on a large scale. This leads to the question of whether or not another component of the Army aviation system—the annual writ—should now also undergo some changes.

The 1973 writ will be the twenty first. It has grown from a single booklet with 100 questions in 1953 to the current publication of four 50-question examination versions as well as a *per aviator* issue of a study guide, reference data booklet (RDB), VFR map and IFR chart. This current format has remained virtually unchanged for the last 10 years. Its purpose has also remained unchanged, i.e., it is "an educational tool designed to refresh Army aviators on flight regulations and procedures and to introduce new regulations and procedures that might not otherwise be familiar." The study guide is provided as both a vehicle for updating aviators on recent changes within Army aviation and as an assist to passing the examination. The RDB contains extracts from the various flight information publication (FLIP) documents required and used by most aviators for other than tactical flights and serves as the basic reference for both the study guide and the examination versions.

Unless it is specifically waivered for their current job or area of assignment, all Army aviators including appropriate Department of the Army civilians (DACs) are required to take the annual writ, either in April, May or June each year, or when returning to flying from a waivered status. Army regulations require that an aviator must have completed the current writ prior to instrument renewal/reissue. Only failure to take the writ when required, or failure to pass one of its four versions, requires further action under current regulations.

The discussion of the other services must be prefaced by the fact that their aircraft, missions and relative size differ significantly from the Army's and that their requirements are unique. Nevertheless, there is overlap particularly in the common goal of providing periodic written examinations for aviation personnel to update, refresh and evaluate individual and unit proficiency and training.

The Air Force employs a 100-question open book, multiple choice examination which is generally changed annually. It is administered in connection with instrument renewal (due the last day of the aviator's birth month) and follows a mandatory 2-day ground school. This training consists of a minimum of 12 hours classroom instruction in regulations, weather, computer, flight instruments, navigational aids and spatial disorientation.

The Air Force uses a comprehensive programed text, AF Pamphlet 60-4, to supplement its ground school. The document is published every few years but can be readily updated and corrected by publishing individual page changes. Those few Air Force aviators excused from the ground school can use the programed text to prepare for the examination. All training material common for all Air Force pilots is provided by the Instrument Pilot Instructor School (IPIS), 3510th Flying Training Wing (ATC), Randolph AFB, TX, to each oper-

ations section charged with the administration of the ground school and exam. Each operations section can and does embellish its ground school sessions (usually held monthly or bimonthly) with those regulations and policies peculiar to its airfield or aircraft.

The general thrust of the Air Force examination is the same as the Army's in that roughly 60 percent of the questions cover various Air Force manuals and the material in Air Force Pamphlet 60-4 while the balance deals with appropriate FLIP documents. The questions pertain to both VFR and IFR procedures.

The Air Force addresses its aircraft in a separate formal program —the annual proficiency written examination—similar in makeup to a comprehensive dash 10 test. This program is conducted annually but 6 months out of phase with instrument renewal. Minimum passing score for the written examinations is 85 percent corrected and critiqued to 100 percent.

Major Air Force commanders may waive classroom instruction requirements or programed instruction under exceptional circumstances but the instrument written examination is not waived.

When an air crewmember fails a written examination, he is allowed a maximum of 2 months after the date of the first failure to complete a successful reexamination. Every reasonable effort is made to recertify the officer and commanding officers determine the number of reexaminations to be allowed based on the individual's experience level, qualifications and number of hours of training required and available. If a successful reexamination is not completed by the end of the 2-month period, the aviator will be placed either in category A (non-compliance because of circumstances beyond the control of the aviator—no further action is taken and, in effect, the requirement is waived) or category B (continued flying status to be determined by a flight evaluation board).

The major differences between the Army and Air Force written examinations are:

- The separate formal programs for aircraft proficiency in the Air Force. The Army does not have a formal Army-wide program in this area.
- One examination version in lieu of four.
- Administration at the time of instrument renewal.
- Mandatory ground school instruction prior to taking the written examination.
- A relatively permanent programed text instead of an annual study guide and reference data booklet.

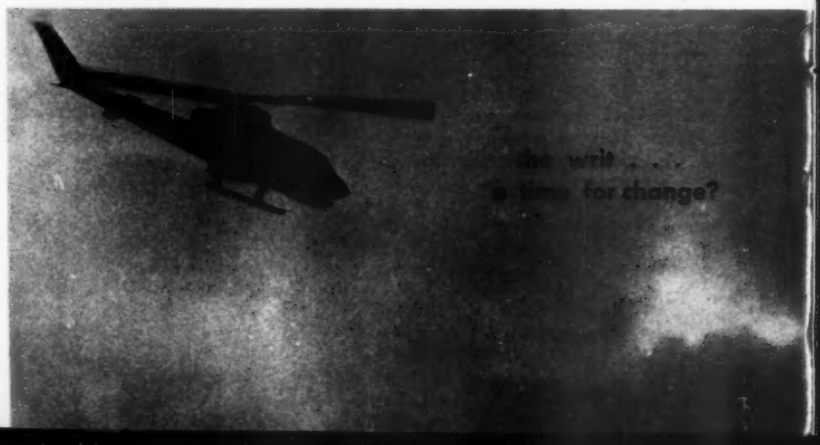
The Navy and the Marine Corps programs differ substantially from those of the Army and Air Force. Both the Navy and the Marine Corps use the Naval Air Training and Operating Procedures Standardization (NATOPS) program. The following paragraphs discuss the NATOPS program in detail.

The NATOPS program is implemented through readiness squadrons located at various East Coast (AIRLANT) and West Coast (AIRPAC) Navy installations and by NATOPS officers found at station, squadron, wing ship, detachment or equivalent levels. There is a readiness squadron for each of the basic Navy flight categories, e.g., VP (patrol and land based antisubmarine warfare aircraft); VA (attack aircraft); VF (fighter aircraft); VH (helicopters); and VS (carrier based antisubmarine warfare aircraft).

Representatives of the two readiness squadrons for each category meet annually with representatives of all Navy and Marine elements who fly the particular aircraft as well as the manufacturer. As a result maximum standardization is achieved in the NATOPS program.

There are five particular aspects of the NATOPS program which are considered pertinent to the annual writ:

- *Mandatory training upon rotation.* All naval aviators prior to reporting to a flying assignment, regardless of experience level, undergo refresher training at the appropriate readiness squadron. This training, which may last up to 3 months, includes standardization in the aircraft in which he will be flying and instrument rating renewal, even if it is not due. The instrument checkride is preceded by a NATOPS written examination.
- *Qualification of unit NATOPS officers.* The readiness squadrons qualify selected naval aviators from the various squadrons/installations/units in the administration of the NATOPS program for their organization. This procedure is somewhat analagous to the Army's examiner program except that the qualification is for both the aircraft and instrument flying and, unless recertified, valid for only 1 year.



Prior to an instrument requalification check flight (right) the Army aviator must first complete the annual writ

NATOPS teams flight check at least one crew from each unit. Here a naval flight officer and an aviator climb into their F-4 Phantom, NAS, Oceana, VA

U. S. Navy photo

Additionally, serving as a NATOPS officer is the aviator's primary duty.

• *NATOPS flight manuals.* NATOPS manuals and flight manuals are prepared for specific aircraft and contain standard flight doctrine and optimum operating procedures for the aircraft model concerned. Instrument flying procedures pertinent to that aircraft are included but general instrument flying considerations, i.e., pertinent Navy regulations, FLIP, etc., are omitted. These manuals are used as the basis for the development by each appropriate Navy echelon NATOPS officer of a year long training program covering all aspects of flight in the particular aircraft. The manuals also serve as the basis, along with other references, e.g., FLIP, Navy regulations, etc., for the NATOPS written examination (prepared annually) and for locally prepared instrument written examinations which must be approved by AIRLANT or AIRPAC. The NATOPS examinations normally consist of 200 or more questions of many types . . . fill-in, multiple choice, etc. The NATOPS exam covers all aspects of flight in the particular aircraft and is, in Army terms, a combination of a thorough dash 10 test and the annual writ. The locally produced instrument examinations are usually 100 questions. The NATOPS exam is both open and closed book, whereas the locally produced instrument exams are generally open book.

• *Annual evaluations.* The NATOPS program requires annual checks of all Navy aviation units by NATOPS evaluation teams. This is their principal duty and they travel from aviation unit to aviation unit throughout the Navy where their particular aircraft is flown. As a minimum the team will flight check the commanding officer, operations officer and local NATOPS officer as well as at least one crew. However, all crew personnel are given the appropriate written examination based on the NATOPS manual for the aircraft. This examination is administered only by the team and none of the examination material is distributed to unit level. The NATOPS written exam normally takes 2 days to administer. No ground school is conducted by the NATOPS evaluation team per se and the NATOPS exam, in addition to testing individual proficiency and knowledge, is also an excellent indicator of the effectiveness of the local training program.

• *Responsibilities of the unit NATOPS officer.* The NATOPS officer at unit level is responsible for administering the remaining flight checks as required. However, though an instrument check is often included in the NATOPS flight check, most instrument renewals are conducted by a local instrument flight board of which the NATOPS officer is normally a member. These boards conduct instrument evaluations of Navy and Marine Corps pilots to include aviators in nearby units where such facilities are not available. Renewal of instrument ratings in the Navy (and Marine Corps) includes both a formal written examination and a flight check. Both must be accomplished in the 60 days preceding an aviator's birthday. Expiration of instrument ratings under NATOPS, as in the Army, is the nearest birthday plus 1 year.

Instrument renewal in the Navy and the Marine Corps requires attendance at a formal ground school, if one is available, and the satisfactory completion of the written examination which must cover the following areas:

• FAA regulations as they apply to flight under instrument conditions.

Continued on page 19

let's not forget about:

VFR

Currently, emphasis is being placed on instrument flying, and as of 31 December 1972 most Army aviators should have received a standard instrument qualification. It's always wise, however, to return to the basics we became so familiar with in initial entry flight training. That is the basics of visual flight rules, and interpreting the VFR chart

CW2 James T. Miller

A LOT OF attention is paid to instrument flight and emphasis is put on renewing instrument tickets. But what about a plain ole VFR cross-country? Is enough attention being paid to this?

From results of FAA Airman Written Examinations [one of these is the comp (Military Competence Exam) test for rated aviators] there is an indication that a knowledge of VFR operation such as controlled airspace and the application of pertinent Federal Aviation Regulations is a weak area in pilot education.

Just as there are traffic laws and restrictions regulating the operation of automobiles in certain areas or zones, there are regulations governing the operation of aircraft within designated airspace. These regulated areas are established only in the interest of safety to apply the regulations pertinent to a particular airspace. A pilot must first be able to determine whether he is within that airspace.

Airspace is unlike streets and highways where there are posted signs or markers of some type; you don't find street signs at 3,000 feet. Consequently, while operating in controlled airspace the pilot must be able to properly interpret the sectional chart. Not everything is shown on sectional charts such as vertical limits and sometimes horizontal limits (for example, the limits of an airport traffic area).

Also associated with controlled airspace are weather minimums for VFR operation in controlled and uncontrolled airspace. This information is not on the sectional chart and is a bit of knowledge that every pilot must know.

The following questions are based on excerpts taken from the New Orleans sectional showing the Ft. Rucker, AL, local area but pertain to all areas. If you can answer them with 100 percent accuracy, there is no need to read further; if not, read on for explanations.

1. What are the limits of an airport traffic area?
2. Which airports have traffic areas?
3. How is an airport traffic area shown on the chart?
4. Around Dothan airport there is a broken line. What does this represent?
5. Around Great Northern airport there is an area that is colored in magenta. What is this area and what are the limits of this area?

6. What are the limits of the airspaces that are colored blue (grey in the figure)?

The answers to questions 1 and 2 can be answered together with the definition of an airport traffic area. *Airport traffic area:* Unless otherwise specifically designated (FAR Part 93) that airspace within a horizontal radius of 5 statute miles from the geographical center of any airport at which a control tower is operating, extending from the surface up to but not including an altitude of 3,000 feet above the elevation of the airport. Reference: FLIP Planning, Section I-12; FLIP Planning, Section II (Arrival), paragraph IVE.

Question 3 might be a little tricky. An airport traffic area is not shown on a sectional chart. The only way to tell if a field has an airport traffic area is to look in the airport information on the sectional. If it says there is a control tower, then there is an airport traffic area.

For example look at Dothan:

FSS
Dothan
CT - 118.4
400 (L) 65
DF

Notice that it has a control tower, so there is an airport traffic area at Dothan.

Question 4. It is a control zone or airspace that is normally a circular area with a 5 mile radius and extensions as necessary for instrument approach and departure paths. (A control tower may or may not be located within the control zone.) It starts at the surface and extends up to the base of the continental control area. The lateral limits are shown on aeronautical charts by a dashed line. Reference: FLIP Planning, Section I-13; Sectional Aeronautical Chart Legend.

Both questions 5 and 6 are control areas with the controlled airspace starting (magenta color) 700 feet and (blue color, grey in figure) 1,200 feet, or as otherwise designated. Reference: FLIP Planning, Section I-13; Sectional Aeronautical Chart Legend.

If you had any problem with any one of these basic airspace questions, it may be time to brush up on VFR operations. One of the better references to use for this purpose is the Airman's Information Manual, Part 1.

If the little bit of information that has been presented here has started some thinking, here are some more to think about.

I'm not going to give the answers, just the references. Use the excerpt from the New Orleans sectional and use the margin for the answers. You might be surprised what has been forgotten since that programed text in flight school.

1. Which airports have facilities for aircraft?

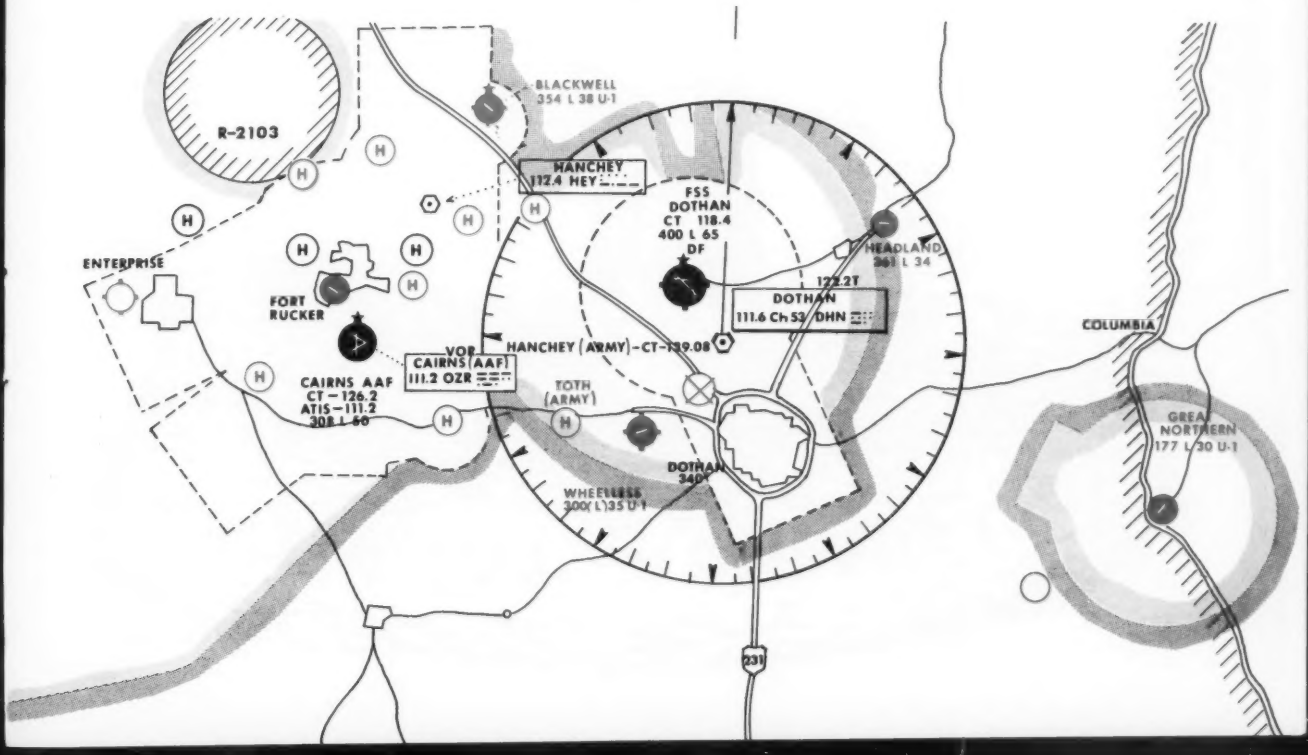
2. Which airports have emergency facilities only or no facilities at all?

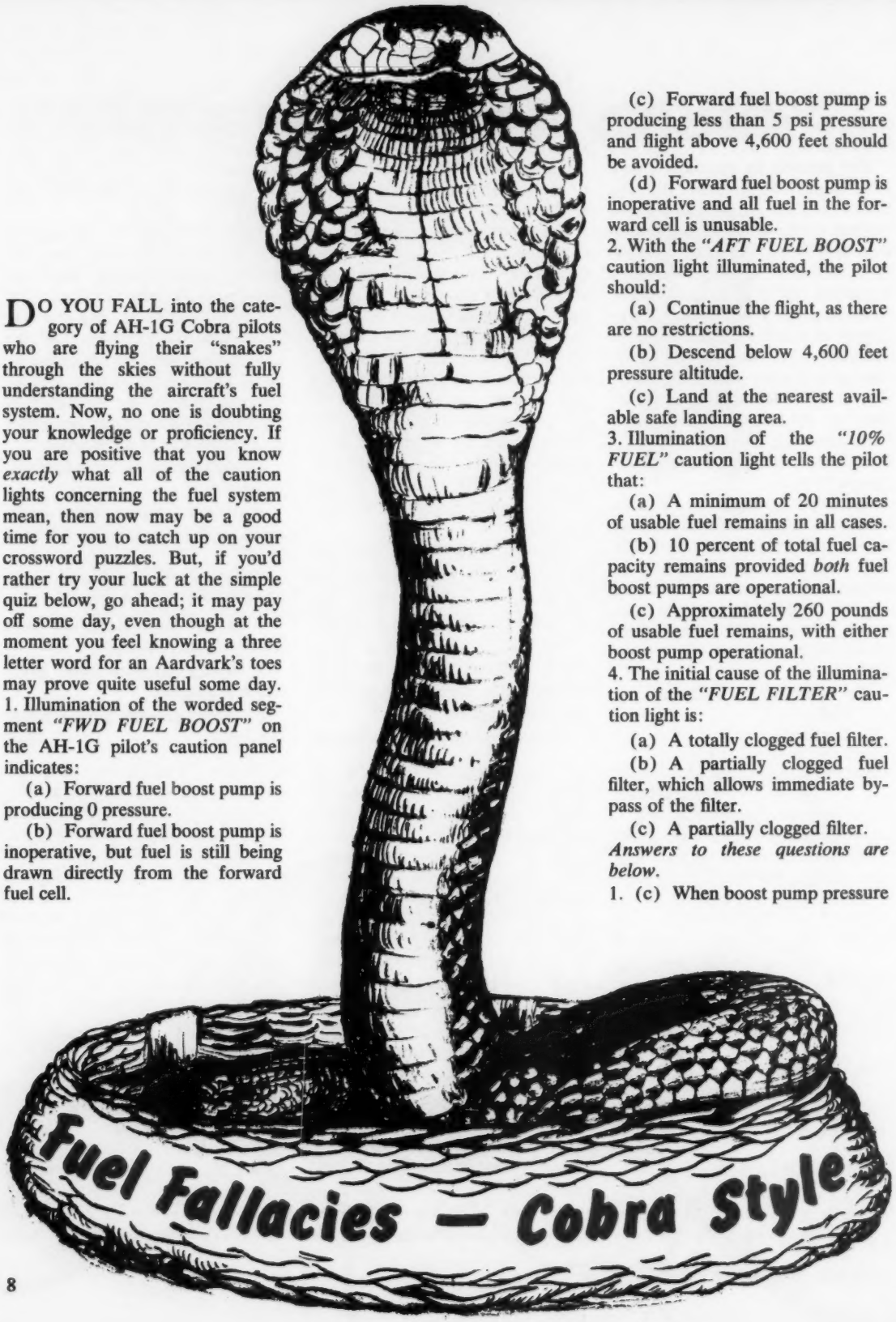
3. Which airports have hard surfaced runways?

4. Which airports do not have hard surfaced runways?

5. Which airports have UNICOM available?

6. Which airports have a rotating light?





DO YOU FALL into the category of AH-1G Cobra pilots who are flying their "snakes" through the skies without fully understanding the aircraft's fuel system. Now, no one is doubting your knowledge or proficiency. If you are positive that you know *exactly* what all of the caution lights concerning the fuel system mean, then now may be a good time for you to catch up on your crossword puzzles. But, if you'd rather try your luck at the simple quiz below, go ahead; it may pay off some day, even though at the moment you feel knowing a three letter word for an Aardvark's toes may prove quite useful some day.

1. Illumination of the worded segment *"FWD FUEL BOOST"* on the AH-1G pilot's caution panel indicates:

(a) Forward fuel boost pump is producing 0 pressure.

(b) Forward fuel boost pump is inoperative, but fuel is still being drawn directly from the forward fuel cell.

(c) Forward fuel boost pump is producing less than 5 psi pressure and flight above 4,600 feet should be avoided.

(d) Forward fuel boost pump is inoperative and all fuel in the forward cell is unusable.

2. With the *"AFT FUEL BOOST"* caution light illuminated, the pilot should:

(a) Continue the flight, as there are no restrictions.

(b) Descend below 4,600 feet pressure altitude.

(c) Land at the nearest available safe landing area.

3. Illumination of the *"10% FUEL"* caution light tells the pilot that:

(a) A minimum of 20 minutes of usable fuel remains in all cases.

(b) 10 percent of total fuel capacity remains provided *both* fuel boost pumps are operational.

(c) Approximately 260 pounds of usable fuel remains, with either boost pump operational.

4. The initial cause of the illumination of the *"FUEL FILTER"* caution light is:

(a) A totally clogged fuel filter.

(b) A partially clogged fuel filter, which allows immediate bypass of the filter.

(c) A partially clogged filter.

Answers to these questions are below.

1. (c) When boost pump pressure

The Cobra pilot who fully understands the "Skinny Huey" fuel system will be in a better position to make the best decision when one of his caution panel segment lights illuminates

Captain Lawrence I. Karpman

drops below 5 psi, a pressure switch in the manifold senses this and illuminates the appropriate fuel boost pump caution light. Below 4,600 feet pressure altitude the engine driven pump will siphon from the forward cell *regardless of boost pump operation* and will permit use of virtually all the fuel in the forward cell. Flight above 4,600 feet should be avoided with either pump out since there is a very real chance of flame-out should the other one fail.

2. (a) There are no restrictions to flight with an aft boost pump inoperative. However, it may be wise as stated in 1(c) above to descend below 4,600 feet with the aft boost pump out in the event the other boost pump fails. The pump of course should be repaired or replaced prior to the next flight.

3. (b) The operation of the 10 percent probes in each cell will cause, with both pumps operational, the first one being triggered to be disregarded. Thus, when the second is triggered the light will illuminate and, if adjusted properly, 160 pounds of fuel will be remaining. This makes b entirely correct. However, if one or both pumps are inoperable, then the first probe being triggered will cause the light to illuminate. This means that with one or either pump inoperable that 20 percent of fuel is remaining. This would be 10 percent in the tank whose probe has been triggered plus 10 percent or more in the untriggered tank. Since below 4,600 feet virtually all fuel is usable, and since one should not be above 4,600 feet with either or both pumps inoperable, then at least 20 percent of fuel will be remaining even if both probes were triggered simultaneously. The idea of 20 minutes of fuel remaining should be used as a guide and *only* a guide, nothing more. Each aircraft will consume fuel at different rates. At the start of each flight the air crew should make a fuel consumption check to determine the rate of consumption for that particular aircraft on that day. I'm sure that you have come in contact with an AH-1G that consumed about 600 pounds per hour. Well, at that rate our 10 percent caution light would become a 16 minute light instead of a 20 minute light (600 pounds per hour equals 100 pounds per each 10 minutes or 160 pounds equals 16 minutes). So, if you fly 18 or 19 minutes into your so-called "20 minute" light, you may find yourself surrounded by the "sounds of silence" and nothing to keep you company on the way down except the low rpm warning audio echoing in your ears. Believe the 10 percent light in all cases. And remember, normal policy requires landing as soon as it is practical once the 20 minute light is illuminated, commensurate with tactical situations and inflight conditions.

4. (c) The *"FUEL FILTER"* caution light indicates *partial* obstruction of the fuel filter. A pressure differential switch mounted in the fuel line across the filter, senses a difference in fuel pressure between the inlet and outlet of the filter. When this pressure differential reaches about 0.85 to 0.87 psi, the pressure switch will cause the caution light to illuminate. When this pressure differential builds to 1.25 to 1.27 psi, the pressure switch will cause the fuel to bypass the fuel filter by closing the filter bypass valve. A glance in the dash 10 for the AH-1G (TM 55-1520-221-10) will advise the pilot to land his aircraft within 30 minutes. Again, we encounter a guideline. It is important for the pilot to understand exactly what is taking place. The figure "30 minutes" is strictly a guide. It is based upon the *estimated* maximum time that the pressure differential between the inlet and outlet of the filter will build from 0.85 to 0.87 and 1.25 to 1.27. Once the bypass valve in the filter opens, you are going to have contaminants flow directly to the fuel control. The pilot *must* keep in mind the fact that it is the *severity* of the contamination that determines the length of time between initial illumination of the fuel filter caution light and the actual bypassing of the fuel filter. If the aircraft was refueled in a combat environment at a hastily or poorly constructed POL point and the fuel filter caution light illuminates, it may be advisable to land (situation permitting) *well* before the 30 minute limitation.

For those of you who successfully answered all of the short questions, we hope we have nevertheless provided a brief refresher on some of the fuel system caution lights. For those of you who may have missed one or two, it may be time to dust off the old operator's manual and refamiliarize yourself with the "Skinny Huey." Any way you look at it, the pilot who fully understands what is taking place when one of his caution panel segment lights illuminates is in a far better position to make the best decision that the situation allows.

Too Much Trust

A more thorough briefing could have prevented the nearly disastrous chain of events

CW2 Gerald E. Rhoads

WE WERE DEEPLY engrossed in a pinochle game in the alert room when the rattle of the field phone drew our attention from the cards. It was a call from the operations clerk—a call setting the mission machinery of Dustoff in motion. As I laid my cards down and started toward operations, the rest of the crew departed for the UH-1H Huey to crank it and have it ready to go when I arrived.

Inside the operations office I began considering the pertinent facts on the mission request sheet. Three Korean soldiers had received serious frag wounds on a mountain side southeast of the An Khe pass in the Republic of Vietnam. Landing would be impossible because of the terrain, thus this would have to be a hoist mission. I instructed the radio operator to call gunships, a Korean interpreter and a flareship because it was getting dark. Then I headed for the flight line.

The aircraft was prepared, started and the crew ready to go. The medic and crewchief had been incountry approximately 2 years and had a great deal of experience working together as a Dustoff crew. They had numerous hoist missions to their credit. The pilot had been incountry 2 months and everybody was satisfied with his performance. This, however, would be his first hoist mission and I wasn't counting on him for too much assistance. Our Korean interpreter was a new man. He spoke excellent Korean but his command of the King's English was less than impressive.

As we broke ground I briefed the crew on the number of patients, their location, and the type of wounds, and began the seemingly endless stream of radio calls to coordinate all the efforts involved.

My radio call to the gunship went unanswered. Since it was getting dark fast and with the gunships apparently still on the ground, I gave up hope of completing the hoist operation within the remaining minutes of daylight. Performing the mission in darkness would mean hovering over the treetops with the landing and search lights on—a job I didn't look forward to.

The situation began to look a little better when I turned the FM radio over to the Korean interpreter and he made contact with the men on the ground. A member of their patrol had triggered a mine and three soldiers had sustained serious frag wounds. The remainder of the patrol had already cut down several trees to provide a shaft into the jungle for our hoist cable. Enemy troops were known to be operating in the area but no contact had been established since the preceding day.

To my relief contact with the gunships was made as we arrived in the vicinity of the pickup zone (PZ). The aircraft commander (AC) of the lead gunship estimated his position at about 10 minutes from the PZ and the flareship was close behind.

The area was dark enough at this time to render smoke grenades useless, but we were able to identify the location of the patients when they fired a distress flare. The 10 minutes passed quickly as the Korean interpreter relayed my instructions on the use of the jungle penetrator to the troops on the ground.

After a briefing on the situation the lead gunship decided on a wagon wheel overhead and coordinated with the flareship. I began an approach to the area with the gunships behind me as the first flare ignited, lighted the area for a few seconds and dropped out of sight behind an adjacent mountain. A second flare appeared but soon came to the same useless end as the first.

I continued the approach and on short final aimed the search light at the PZ for a low recon. The flareship had adjusted his position and a flare ignited to reveal more details of the area. The patients were under 75-foot trees at the bottom of a narrow shaft in the higher trees around the PZ. With the help of the crew I hovered down into the opening until I could descend no further; then the medic began lowering the hoist cable.

All was proceeding well as the jungle penetrator started down toward the Koreans. The crewchief and medic kept a constant stream of position advice going and we were able to remain centered over the patients. Periodically a gunship would appear to the right front and then disappear to the left front, circling overhead. The flareship chased away the darkness with well positioned flares.

Suddenly for no apparent reason the interpreter began shouting something at the troops on the

ground. My earphones were filled with his irritating chatter. Underneath this noise I heard the medic announce that we would be taking on weight in about 10 seconds.

"How many patients?" I shouted.

"Three," came the medic's weak but audible reply.

"That's too many," I returned, not knowing whether or not I had been heard. "Don't pull them off the ground!"

"What?" he shouted, but the Korean chatter covered his words like a shroud.

"Don't take on any weight!" I shouted. "Interpreter! Tell those people to get one of the men off that hoist!"

The Korean continued to talk, seemingly oblivious of anything I had said. It became obvious that his constant hollering had blocked communication between the medic and myself when I heard the medic shout, "Taking on weight!"

"No!" was all I had time to say, but the hoist had already been activated. As the patients broke ground, their weight pulled the aircraft right and nose low. We had gone beyond the center of gravity limits.

"Put 'em down!" I yelled as the cyclic hit the left aft stop.

In a matter of a split second it was too late to get the patients back on the ground safely. I pulled all the pitch I dared and instructed the pilot to stand by on the cable cutter. His cyclic was equipped with a hoist control that would override the medic's controls, but it was already too late to use it.

The ship was nearly uncontrollable and drifting forward and to the right toward the high trees. It finally began to climb but continued to drift. I hit 50 pounds of torque in an attempt to clear the tall trees in front of us before the unbearable weight dragged us to certain disaster. We continued to climb, but at the same time we got closer and closer to the trees.

To cut the cable and release the weight would mean death to the three men on the hoist. To continue drifting could mean death to eight people. Should I risk the lives of five men to try to save three already seriously wounded soldiers? Or should I guarantee the safety of the five by sacrificing the three? The possible consequences of either course of action was not a pleasant thought.

I made my decision and continued to climb. The aircraft just barely cleared the treetops, but 50 feet below us three wounded men were getting smacked and scratched by the branches of a dense jungle as the cable freely swung to and fro.

Finally the penetrator broke through the treetops and the danger of entangling the cable was past. We were still drifting with only marginal control but at least were beyond the reach of the deadly obstacles. Seconds later the patients were aboard the aircraft and I had it under control. I eased the cyclic forward picking up some air speed and we were on our way to the hospital.

Hindsight reveals that poor crew coordination had very nearly cost the lives of eight people. Several valuable lessons were learned—the hard way.

Partly because of the language barrier and time factor the Korean interpreter had not received adequate instruction in the use of the hoist. He did remember at the last minute that quick, expeditious work was important to the success of a hoist mission. This was the reason for all the hollering on the radio. He had told the ground troops to put all three patients on the hoist together. Combine this with his deplorable radio procedures and an already poor situation got worse.

The medic could not understand me because of the garbled chatter of the interpreter in his earphones. He was forced to make a decision that normally would be made by an aircraft commander. He remembered correctly that the hoist capacity is 600 pounds, that three Korean soldiers would seldom weigh that much and that too much time at a high hover is dangerous. Putting these facts together he decided that bringing all three patients up at once was a good idea in that it would reduce hover time. It is true that a hoist mounted on a solid platform should be able to lift 600 pounds, but it is poor judgment to try lifting this much weight from a Huey hovering 75 feet in the air. This second aspect had not been part of the medic's education. Being more interested in arteries than aircraft he had accepted the 600 pounds limit at face value and never considered any other factors.

Mistakes were made by others that night but the ultimate responsibility should be dumped into my lap. Decision making and crew coordination are an aircraft commander's reason for existing, and I failed on both accounts. The mission was successful by the grace of God and the guts of an H model Huey—neither of which was materially influenced by me. Based on their long experience incountry and length of time they had worked together, I assumed that the medic and crewchief were proficient enough to handle any situation. By not providing more detailed instructions regarding the capacity of the jungle penetrator, I allowed the situation to develop to a point that forced the medic and crewchief to make a decision for which they were not prepared.

The most serious error, however, was not providing the entire crew with proper coordinating instructions and guidance. A more thorough briefing prior to the actual operation could have prevented the nearly disastrous chain of events from ever beginning.

Charlie and Danny's Write-In

Dear Danny: When adjusting the voltage output of the generator on the UH-1H, it seems that a multimeter should be used. Some maintenance personnel insist that the aircraft voltmeter is sufficiently accurate. Can you shed some light on this controversy? Thank you.

CW2 C. A. P.

Danny's answer: You are correct in your assumption. When adjusting the voltage regulator on any of the UH-1 series aircraft, a properly calibrated and accurate multimeter must be used. After properly adjusting the voltage regulator, the D.C. voltmeter in the aircraft must also be properly calibrated with the multimeter. The D.C. voltmeter in the aircraft can be set easily to different values. Changing the reading on the D.C. voltmeter has no bearing on the output of the generator.

DEAR DANNY: Several months ago, prior to receipt of the dash 20 TM change containing the daily engine recording information, one of our direct support mechanics was on leave in the Ft. Rucker, AL, area and took time out to visit the U. S. Army Aviation School (USAAVNS) and gather up information and forms to enable us to monitor engine performance of two UH-1H aircraft.

During a recent survey of our activity by the U. S. Army Europe Standardization and Safety Board, we were informed that the only authorized engine check was the one outlined in the dash 20 TM. Their rationale being that it was more accurate than the USAAVNS check since the dash 20 requires that it be performed in the air at an established pressure altitude. However, after taking a "light engineering" look at the School's procedure, I believe it accomplishes the same goal with little or no loss of accuracy and has several advantages over the dash 20 procedure in that it is accomplished *before* the aircraft is in the air. It provides the pilot with an immediate reference to standard performance and requires no airborne cockpit computations. It is also significant to note that at this location the check is always accomplished about 30 feet above sea level.

Your research, information and recommendations on this subject will be greatly appreciated.

LTC M. H. W.

Danny's answer: 1. We checked with the U. S. Army Aviation Systems Command (AVSCOM) on the DER and HIT checks and were offered the following comments:

a. The daily engine recording (DER) procedure is the only authorized condition monitoring procedure for aviation turbine engines Army-wide.

b. The health indicator test (HIT) procedure is similar to the DER, and if conscientiously employed could be a useful condition monitoring tool. It is not currently authorized for Army-wide use.

c. No comparative evaluation has been conducted to determine if either HIT or DER offer a significant advantage, one over the other.

d. The DER or HIT programs should not be used as a go/no-go gauge, but rather as a means of monitoring performance trends in order to discern engine degradation.

e. Historically, it can be shown that engine catastrophic failures are preceded by gradual performance degradation, rather than by a single quantum performance loss. For this reason DER readings need not be *computed* in the air. They can be computed on the ground following the flight.

f. The practice of pilots using the HIT check as a go/no-go gauge is of dubious value. It is possible that missions may be unnecessarily aborted due to such practice. A last minute abort can adversely impact unit mission accomplishment.

2. USAAVNS has special authorization from CONARC and AVSCOM to use HIT procedure because of aircraft density in its area of operations.

3. So, we would recommend that all units continue to use the DER program in accordance with applicable dash 20 technical manuals.

What's Your IFRIQ?

Charles A. Thomley, DAC

WHAT DISTINGUISHES an instrument rated aviator from a nonrated aviator? Is it just the 10 additional hours of experience that one gets from the standard instrument program? Does an instrument rating make an "IFR proficient" aviator?

Surely if one has an instrument rating on his certificate, he is entitled to the privileges that go along with the rating. Does this necessarily mean that he is qualified to use these privileges? Certainly he has fulfilled the requirements for obtaining the rating and has completed the checkride to the satisfaction of the instructor pilot, and at the moment the rating is issued he is at best a "beginning" instrument rated aviator. He has met the *minimum requirements* for *obtaining* the instrument rating. Probably the aviator himself is the only person who knows his proficiency.

Let's look at a few questions which might serve as indicators in determining whether one has acquired the knowledge necessary for proficiency as an instrument rated aviator. Answer these questions and then decide for yourself whether you are confident of yourself with respect to "IFR knowledge."

TRUE FALSE

1. ( ) ( ) In order to legally carry a passenger you must have made at least five takeoffs and landings to a full stop in an aircraft of the same category, class and type within the preceding 90 days.

2. ( ) ( ) You may act as pilot in command of an aircraft in IFR weather conditions without an instrument rating provided you remain outside of controlled airspace.

3. ( ) ( ) Instrument flight rules do not apply to IFR flight in uncontrolled airspace.

4. ( ) ( ) You may operate legally under IFR in controlled airspace without an instrument rating provided it can be accomplished in VFR weather conditions.

5. ( ) ( ) IFR conditions always make it necessary to fly the aircraft solely by reference to instruments.

6. ( ) ( ) It is solely the pilot's prerogative to cancel his IFR flight plan.

7. ( ) ( ) A pilot's retention of an IFR flight plan will afford him traffic pattern priority over VFR traffic.

8. ( ) ( ) Except in the event of a two-way radio communications failure, if a clearance beyond the limit fix is not received before arrival over the fix, the pilot is expected to hold at the fix.

9. ( ) ( ) To authorize a pilot to execute his choice of instrument approach the controller will simply state that the flight is "cleared for approach."

10. ( ) ( ) Clearances authorizing instrument approaches are issued on the basis that if visual contact with the ground is made before the approach is completed the pilot will continue by using a contact approach.

11. ( ) ( ) Acceptance of a radar approach by a pilot waives the weather minimum requirements.

12. ( ) ( ) Required airborne VOR equipment checks should be accomplished under VFR.

13. ( ) ( ) DF approach procedures are not landing procedures. They are emergency procedures for getting an aircraft below clouds and within visual contact of the airport.

14. ( ) ( ) An ARTCC clearance assures you of separation from VFR traffic.

15. ( ) ( ) An ATC clearance *must* be obtained prior to operating an aircraft under IFR in controlled airspace.

16. ( ) ( ) The hands on the altimeter indicate in feet the difference between the actual atmospheric pressure being sensed and the pressure set in the Kollsman window.

17. ( ) ( ) Increasing the altimeter setting results in a decrease in indicated altitude.

18. ( ) ( ) Operation on the emergency static source usually indicates a lower-than-actual altitude.

19. ( ) ( ) An "unattended" VOR provides no air/ground communications service.

20. ( ) ( ) The only positive method of identifying a VOR is by its coded or voice identification.

21. ( ) ( ) Only L class VORs are used to describe victor airways on the low altitude enroute chart.

22. ( ) ( ) When an IFR flight is controlled by radar, and the control of the flight is handed off from one controller to another, after the aviator makes his initial contact on the frequency change the new controller must state "radar contact."

23. ( ) ( ) The symbol found on approach charts applies to takeoff minima for military aviators.

24. ( ) ( ) In planning for an IFR flight the estimated time enroute to destination is computed from takeoff to the final approach fix.

25. ( ) ( ) Under lost communication it is permissible in some cases to descend and to climb while enroute.

Answers

1. FALSE. An Army aviator who has completed qualification training in the particular type and model aircraft and is currently proficient IAW AR 95-1, paragraphs 2-7a and b, is authorized to transport passengers in Army aircraft IAW TC 1-34, section I, paragraph 4.

2. FALSE. The pilot in command of an Army aircraft is prescribed in AR 95-2, paragraphs 2-1a and b. Only Army aviators who hold a current instrument qualification may be cleared for flight under instrument conditions (AR 95-2, paragraph 3-7). AR 95-63, paragraphs 2-2a(1),b(1) and c(1) prescribes which Army aviators are authorized flight under instrument conditions.

3. FALSE. FAR 91.119(a)(2)(i)&(ii) and FAR 91.121(b) give the IFR cruising altitude rules for use in uncontrolled airspace.

4. FALSE. See AR references in answer 2, above.

5. FALSE. The instrument aviator is "off and on" instruments many times during most instrument flights, i.e., flight between layers, climbing/descending through broken conditions, instrument approaches and takeoffs and many other flight/weather conditions too numerous to dwell upon. The definition pertaining to IFR conditions concerning the Army aviator is found in AR 95-2, paragraph 1-2q.

6. TRUE. AR 95-2, paragraph 3-15, subparagraph c, states: "An aviator operating with an IFR traffic clearance may cancel such clearance and proceed under VFR conditions provided he is operating in VFR (visual flight condition) when such action is taken. The appropriate ATC agency will be advised as soon as possible."

7. FALSE. DOD FLIP Planning, section II, paragraph IV. F. I (Arriving) covers this information for Army aviators.

8. TRUE. DOD FLIP Planning, section II, paragraphs III. A. I., III.C. and III.2.1.d. explain this for aviators.

9. TRUE. DOD FLIP Planning, section II, paragraph IV.F. and TM 11-2557-29, paragraph 1020.

10. FALSE. DOD FLIP Planning, section II, pilot procedures IV, E.1, says: "If visual contact with the ground is made before the approach is completed, the complete procedure will be followed unless the pilot receives approval for a contact approach or cancels his IFR flight plan."

11. FALSE. Weather minimums *for* a radar approach are published in the IFR Supplement. Those are to be used.

12. TRUE. VFR conditions must exist in order for the aviator to reference some object to check the VOR equipment. The statement said *airborne* checks.

13. TRUE. Reference is found in DOD FLIP IFR Supplement and TM 11-2557-29.

14. FALSE. AIM, part I, under chapter titled ATC clearances/separations, subparagraph adherence to clearances example 5(2), says: "Traffic clearances will only provide standard separation between IFR flights. During the time an IFR flight is operating in VFR conditions, it is the direct responsibility of the pilot to avoid other aircraft, since VFR flights may be operating in the same area without the knowledge of ATC."

15. TRUE. Reference FAR 91.115.

16. TRUE. TM 1-215, chapter 2-33, says that the pressure altimeter is essentially a pressure measuring device calibrated to correct atmospheric pressure to an altitude indication. The base for the altitude indication is the pressure that is set in the Kollsman window.

17. FALSE. The atmospheric pressure is always greater at ground level over a specific location than at

altitudes above the location. Therefore, if you "set in" a higher pressure level, you have selected a lower altitude for your altimeter to use as a reference. If your position hasn't changed, then the altimeter will indicate a higher altitude.

18. FALSE. The altimeter will lag but will indicate the actual altitude with the same accuracy that it did before the emergency static source became necessary.

19. TRUE. AIM, part I, chapter 2 (navigation aids) under VOR, subparagraph 5, states: ". . . If no air/ground communications facility is associated with the omnirange, 'airville unattended VOR' (VORTAC) will be heard." Those radio aids to navigation not having air/ground communication service are identified on DOD FLIP enroute charts by underlining of the frequency.

20. TRUE. Reference TM 1-225, paragraph 10-5c.

21. FALSE. Both L and H type VORs are used to depict or mark airways. The IFR Supplement lists the class VOR under "Radio Aids to Navigation" for each airfield and it also lists the class VOR for each VOR listed in the supplement. For example, Montgomery VOR MGM on V-7 is an H VOR.

22. FALSE. AIM, part I, enroute IFR, communications, paragraph 2g(3) flights in a radar environment, says: "ATC will inform a pilot that he is in 'radar contact' (a) when his aircraft is initially identified in the ATC system; and (b) when radar identification is reestablished. . . . This fact will not be repeated to the pilot when handed off to another controller. . . ."

23. FALSE. a. The symbol ▽T indicates that other than standard IFR takeoff minimums *or* departure procedures apply for that aerodrome *for civil users.*

b. AR 95-2 (paragraph 3-10.f) states takeoff minima for Army aviators. However, when exercising this authority it is expected the pilot in command has considered all aspects stated in paragraph 3-9.b.(1), AR 95-2.

c. Military aviators include all services. Unfortunately, each service has different IFR takeoff minima rules.

24. FALSE. DOD FLIP, section II, under preflight procedures in ETE section, we find for an IFR flight plan the ETE is "the time from takeoff to the last fix shown" on route of flight section. Then in the same preflight section of section II, under route of flight we find "the last fix entered (IFR) will be the initial approach fix to the destination airfield." The question is true when the FAF qualifies as an IAF (see NDB Rwy 22, Campbell AAF, volume 6).

25. TRUE. The IFR Supplement under emergency procedures, section I, procedures for two-way radio failure IFR-VFR paragraph C (IFR) subparagraph (2) altitude, states for lost commo we should be at the highest of the following altitudes or flight levels for the route segment being flown: the altitude or flight level assigned in the last ATC clearance received, the minimum enroute altitude or the EFC altitude. So if the last assigned altitude is 5,000 feet and the MEA for the next segment is 6,000 feet (and with no EFC altitude), we would climb to 6,000 feet. Then if the next succeeding MEA is 3,000 feet the higher of our two choices (5,000 feet and 3,000 feet) would be lower than 6,000 feet, so he would descend to 5,000 feet.

VIEWS FROM READERS

Continued from page 1

latest evaluation with only one minor incident when an AH-1G flew into wires but caused no damage to the aircraft. Therefore, the threat is not as serious as it first appears. Pilots must be trained to this environment and emphasis has to be placed on a low air speed such as 40 to 60 knots. It is impossible to do your job at 100 knots anyway.

I further disagree with LTC Hull in his belief that there is a requirement for sophisticated new equipment in a helicopter, to aid the pilot in flying in this environment. Scout helicopters or an antiarmor helicopter, have no requirement for electronic countermeasure equipment. That isn't their task. The state-of-the-art for radar scanning is such that it could be utilized in helicopters without prejudicing the weight limitations. However, the main deficiency appears to be in a navigational aid. This I do not believe is necessary. For one, the equipment does not work at NOE. Second, the equipment is seldom designed for the helicopter therefore is too costly in weight. Third, pilots and observers can be trained to navigate NOE. We have trained personnel at different times for over 2 years for our trials. The Canadians have been doing it for over 10 years successfully. Navigation in Europe is not difficult. There are many tricks-of-the-trade such as all of the numerous towns and villages in West Germany have road signs on all entrances to them. The roads, railroads, canals and rivers are numerous and are excellent landmarks. But, once again, people have to be trained properly. In Canada we have an old expression in the Forces, "Keep It Simple Stupid" or KISS, which is exactly what is required of helicopters. Keep it simple, inexpensive and designed for the primary roles of reconnaissance and as tank killers. That is the threat in Europe. Forget the HumRRO Technical Report 71-10. Train people in Europe where the real environment is.

It is impossible to overemphasize the requirement to fly NOE especially in Europe. It is the key to survival, not sophisticated equipment. Therefore, training should be initiated immediately if the helicopter units in Europe are going to be capable of fulfilling any role in USAREUR.

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Aeromedic

VERY OFTEN our misdirected efforts are so obviously costly to man's vitality, operational performance and efficiency that they prompt immediate and obvious corrective action. However, there also are times when the subtle consequences of environmental stress develop so insidiously—or marginally—that they escape attention or correction. Take for example the pain resulting from the bends as discussed in the following article.

It has been said that igorance is bliss and that what you don't know can't hurt you. While these may be comforting sentiments in helpless and futile moments, they are back turning and retrogressive in Army aviation. More intuitively translated, they mean: *What you don't know, you can't tell anyone about . . . and thus you suffer or die with that lack of knowledge.* In practice the result is: *What you don't know, you overlook and frequently suffer with in ignorance.*

The U. S. Army Aviation School (USAAVNS) at Ft. Rucker, AL, has always guarded against these sentiments. A significant example is reflected in the steps taken by USAAVNS to emphasize the Army air crewman's knowledge of his own human capabilities and limitations. Since June 1970 USAAVNS has formally incorporated academic instruction in aeromedical subjects and physiological training exercises into the majority of its programs of instruction. The low pressure altitude chamber is one device

To Bend OR Not To Bend

Lieutenant Colonel William Caput, M. D.

IT IS BELIEVED that the first reported incidence of bends occurred among U. S. Army aviators during a series of flights being conducted to evaluate an electronic system. The unit conducting the evaluation consisted of seven Army aviators who flew daily missions for 2 days, then rested on the third. The aircraft flown was the U-21 Ute an unpressurized, retractable gear, low winged monoplane powered by twin turboprop engines. Each aircraft carried two pilots and an electronic payload.

The oxygen system aboard the aircraft consists of the MD-2 oxygen regulator and the MS-22001 (A-13A) mask. This regulator is of the pressure demand type that mixes ambient air with cylinder oxygen. As the flight altitude increases, the aneroid mechanism increases the oxygen content of the gas delivered to the mask. Above 32,000 feet 100 percent oxygen is supplied automatically. The aircraft carries two bottles of high pressure gaseous oxygen which on normal setting will last 8 hours for two pilots.

Two missions were flown each day. Except for the ceiling the operating procedure was indentical in every flight. After takeoff the pilots climbed to the assigned altitude and at 10,000 feet utilized the normal oxygen setting on the regulator. The usual climb to altitude required 30 to 35 minutes. Once at altitude the planes orbited for 4 to 4½ hours and then landed.

During the first 3 weeks the flights were flown between 20,000 and 24,000 feet without difficulty. During the next 10 flights the ceiling was raised to 26,000 feet. Four aviators experienced joint pain—each on two or more missions. The other three did not. When this problem was brought to the flight surgeon's attention all aviators were grounded for 72 hours. No succeeding flights were permitted above 24,000 feet. As an added precaution 100 percent oxygen was selected from the ground up, allowing 45 minutes of denitrogenation. In the subsequent 6 weeks these aviators did not experience any problems. The following case histories were recorded.

Case No. 1: Mr. S. is a warrant officer who experienced symptoms on three of his four flights to altitude. His first mission was completed without difficulty. On the subsequent day, however, he noted a dull aching pain in his right knee after 30 minutes at 26,000 feet. He also noted a creeping itchy sensation in the skin of his arms and trunk. The intensity of the

Provided by the Society of
U. S. Army Flight Surgeons

acquired to mitigate the stresses discussed in the two previous "Aeromedic" articles and exemplified in the adjoining article.

All Army air crewmen must be knowledgeable of environmental stresses and human physiological limitations even though the frequency of encountering them may be small. The fact is that most Army aircraft and missions are capable of introducing these stresses. Whether it be due to individual or personnel motivation (including daring), geographical, geophysical or geopolitical constraints, air crewmen will eventually use their capabilities and those of the aircraft to complete the mission. For this they must be prepared. Unfortunately, the air crews discussed in the following article did not have the benefit of USAAVNS' latest educational programs. It is comforting to know that future air crewmen will be able to extend their mission performances and operational efficiencies through an intimate knowledge of their physiological capabilities and limitations.

LTC NICHOLAS E. BARRECA, M.D.
Deputy Director
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U. S. Army Aviation School
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This is the last of three articles on evolved gas dysbarism. In this story are four case reports of gas dysbarism experienced by U. S. Army aviators

Captain Tom Walker, M. D.

pain was at first minimal but progressed during the flight. He noted considerable relief upon descent to 20,000 feet and complete disappearance of these symptoms before touchdown. This rapid resolution of pain during descent was an invariable pattern for all of the involved aviators.

Mr. S. also flew the afternoon flight of the second day. His pain began almost simultaneously with arrival at altitude. The pain was more intense and soon spread to involve the right ankle and right hip. Despite his discomfort he was able to complete the mission. He was again symptom-free at touchdown except for a slight limp.

After 48 hours rest Mr. S. flew his final mission. The onset of pain was immediate and excruciating. His pain spread rapidly from the right knee to the right ankle and hip, and finally into the abdomen. The itching sensation was again noted, but was overshadowed by the pain. Descent brought only partial relief and he was "bent" for 24 hours with abdominal pains.

Case No. 2: Captain H. made three flights on 3 successive days and developed symptoms during each flight. On the first day his pain was localized to the left knee and was an annoyance only. On the second flight the pain began sooner, spread to involve the left hip and ankle, and was much more intense. On the third flight his pain was severe. He stated he was able to fly because at altitude the aircraft required no rudder control. He also noted a cold sweating sensation with the onset of pain. Pain relief was associated with reduction in altitude. Complete relief occurred by touchdown on every flight except the last. Following the last flight Captain H. was left with a limp that persisted several days.

Case No. 3: Major S. experienced symptoms during both of his flights to 26,000 feet. On the first flight the onset of symptoms was delayed for 3 hours. Major S. experienced a mild throbbing pain in the right knee which he related to a draft blowing on his legs. The quality of the pain was not altered by movement of position. Descent afforded complete relief from pain, but he noted a lingering stiffness in the right knee. After a 48-hour rest he flew his second mission. After 1 ½ hours his right knee began to ache. Because of the intensity of the pain, Major S. considered aborting the mission but continued. At touchdown he was pain free, but marked stiffness was noted in the right knee for several days.

Case No. 4: Captain F. was the fourth symptomatic aviator in this circumstance. His narrative was compiled from flight records, medical records and interviews with his colleagues. He experienced pain on both his flights to altitude. During the initial flight he had moderate pain in the right knee. On the second flight the pain was much more severe and involved the ankle and hip on that side. After the second flight he was noted to limp for several days. Additional information such as other symptoms of dysbarism, pain relief on descent, etc., could not be gathered.

Of seven aviators exposed at 26,000 feet, four developed symptoms compatible with bends on their first or succeeding flight. At least two experienced symptoms suggestive of other forms of evolved gas dysbarism. Each symptomatic aviator experienced symptoms sooner and more intensely upon reexposure. Each reexposure produced a spread of symptoms to the larger adjacent joints. Reduction of pain was proportioned to reduction of altitude and considerable relief was obtained at 20,000 feet.

These symptoms are very suggestive of evolved gas dysbarism; however, the incidence is considably higher than predicted from available data. The problem to be addressed then is one of diagnosis. Realistically, no firm diagnosis can be proven in these cases. One can, however, evaluate special factors that may have produced an unusually high incidence of dysbarism and consider the logical alternative to the diagnosis of bends.

Physical exercise significantly increases the incidence of bends at altitude. The only activity performed by the aviators was flying the aircraft. This duty was alternated on an hourly basis and in fact did not require use of the rudder pedals.

Older aviators appear more susceptible to evolved gas dysbarism. The range of ages for all pilots in this series was from 24 to 34 years, with a mean of 2.1 years. The average age of symptomatic aviators was 27.6 years, while the symptomatic pilots averaged 30.2 years.

Certain other factors were considered to explain the variance from expected figures. All seven aviators smoked. Each considered himself to be in good physical condition, though none found the time to exercise regularly. No aviator was obese. There was no statistical height-weight difference between symptomatic and nonsymptomatic aviators. None had engaged in SCUBA (self-contained underwater breathing apparatus) diving prior to flying and none remembered previous injury to an involved joint.

Cooling of an extremity may predispose the occurrence of bends. Indeed, one pilot associated the onset of joint pain with a cool draft on his knee. No others made this association. Neither side was associated with pain in a particular knee, as one might expect from a draft.

The constant finding was that if pain developed in one knee on a flight, during the next flight it would occur more intensely in the same knee without regard to the seat in which the aviator sat.

The length of exposure and the repeated nature of exposure are the last and perhaps the most significant factors producing an increase in evolved gas dysbarism in these men. Most series reflecting the incidence of bends are based on exposure of 2 hours or less. The average duration of flight for these men was 4 hours. Two or four aviators experienced symptoms only in the latter stages of flight, well after 2 hours had elapsed.

Evolved gas dysbarism also occurs more frequently in those who have experienced it previously. When it recurs it is usually in the same joint. Air Force and Navy regulations wisely medically restrict pilots for a defined period after they experience evolved gas dysbarism to minimize this risk of recurrence. All symptomatic aviators in this series continued to fly after initial difficulty. Each experienced more profound symptoms in the same joint, which occurred sooner and often involved adjacent joints on reexposure. In every case the reexposure was within 36 hours of the initial flight.

If not all of these aviators, or if indeed none of them had dysbarism . . . then what are the alternative diagnoses? Certainly hysteria would explain all the symptoms. However, two facts are not satisfactorily explained by hysteria: First, the involved aviators were stable and highly motivated and completed every mission often in the face of considerable pain. Second, because of scheduling, other duties and alternate flights, each was unaware of the other's difficulties until just before the final mission. Each had attributed his pain to muscle cramps, arthritis or the aging process. Only when they compared notes did they realize a common problem was involved.

Another possibility is that of musculo-skeletal pain occurring in a cold cramped cockpit. The difficulty with this hypothesis is that it does not explain why symptoms did not appear in the numerous other flights below 24,000 feet in the same cold cramped cockpit.

Although a diagnosis of evolved gas dysbarism cannot be absolutely confirmed in these cases, it is evident that bends did occur in the four symptomatic aviators. The variance from expected incidence are best explained by the length of exposure and the repeated nature of the exposure. Hysteria and musculo-skeletal pain as an alternate diagnosis fail to explain certain aspects of the case. Thus this is believed to be the first reported occurrence of the bends among U. S. Army aviators.

Whither The Writ

Continued from page 5

• Navigational systems and procedures, instrument approach procedures and radio communication procedures.

• Meteorology (including the characteristics of air masses and fronts and the weather associated with them) and the availability, evaluation and use of meteorological reports.

• Instrument procedures contained in pertinent military directives. The written examination is administered subsequent to the formal ground school. If such a school is not available, the command to which the naval aviator is assigned is responsible for administering the examination.

Unless a pilot's instrument checkride coincides with the administration of the NATOPS written examination, his written exam is prepared locally, along with the ground school, by the instrument flight board.

The unit NATOPS officer in conjunction with operations personnel also develops a programed training schedule for the unit which outlines the general subjects to be covered by the NATOPS and instrument examinations. It may be only a schedule for study but could be in the form of a programed text or study guide depending on the complexity of the aircraft and the level/mission of the unit.

Other Navy regulations also impact on written examinations for naval aviators. These include:

• Those naval aviators not currently on flying status or flying other than Navy aircraft do not take the NATOPS or instrument examinations. This is essential because the NATOPS program is oriented to the aircraft an aviator is currently flying.

• The Navy extends under certain circumstances the expiration date for instrument ratings. In such cases the aviator must complete a formal course within 90 days of the end of the extension period. In the event of failure on the part of a naval aviator to successfully complete one of the written examinations, his commanding officer will review the individual's case and determine whether an extension be granted or board action initiated.

The NATOPS program is an integral part of Marine Corps aviation. No deviations from the Navy program are authorized. The Marine Corps operates a few aircraft not flown by the Navy, but these aircraft are part of the Navy inventory. As such, their operations are subject to all NATOPS regulations.

The Marine Corps has its own retraining air groups called U. S. Marine Corps Combat Readiness Training Groups. There are two of these—one on each coast—for all fixed wing Marine tactical aircraft. Other Marine aircraft crews (C-130s, helicopters, etc.) are handled by separate training squadrons also located one on each coast. The groups and various squadrons function much the same as the Navy's readiness squadrons. The Marine Corps uses the NATOPS manuals for all aircraft it operates. [Note: While it is true that the Marine Corps makes the bulk of the inputs to NATOPS manuals governing the aircraft it alone operates, these manuals remain NATOPS manuals in every sense.]

A formal training syllabus is also required for the Marine pilot upon reassignment; however, except for Marine pilots exchanged with the Navy, the training is conducted at

U. S. Navy photo

U. S. Navy and Air Force pilots discuss training of their services during an air tactics training program, NAS, Oceana

U. S. Navy photo

Retraining air groups implement the NATOPS program. One RAG checks antisubmarine aircraft such as these in formation near the *USS Ticonderoga*

the appropriate Marine training group or squadron.

The Marine aviation unit NATOPS officer is certified for 1 year by the appropriate Marine training group or squadron (with the exception of Marine aviators on duty with the Navy). He has the same responsibilities and qualifications as his Navy counterpart.

As stated, the Marine Corps uses NATOPS manuals for all aircraft it operates. The written examinations are prepared based on these manuals but, unlike the Navy, the NATOPS exams are prepared locally (squadron level) and approved by either Fleet Marine Force Pacific (FMFPAC) or Fleet Marine Force Atlantic (FMFLANT). The exams are similar in content and format to the Navy NATOPS exams for the NATOPS flight manuals specifically outline the areas to be tested for each aircraft. Instrument written examinations are prepared at group level, approved by FMFPAC or FMFLANT as appropriate, and are administered at wing level normally.

The Marine Corps, as the Navy, conducts annual NATOPS evaluations of each Marine aviation unit. The team generally comes from within one of the three Marine air wings and the commander, executive officer, NATOPS officer and operations officer, as well as one air crew, are usually flight checked. The program is coordinated with the appropriate combat readiness training group or squadron.

The Corps also conducts periodic unannounced unit checks when teams from group or wing administer a NATOPS written examination to an entire unit (it will be the Navy's exam for those aircraft flown by both services). This is done even if the unit recently completed a locally prepared NATOPS examination.

The duties of the unit NATOPS officer in the Marine Corps are the same as those in the Navy. He conducts the balance of the flight checks within his unit and may, as a member of the instrument flight board, conduct instrument renewals. He also may be responsible for the preparation of the NATOPS examination and/or the instrument examination depending on the level of his unit.

The same regulations apply to Marine aviators with regard to taking the NATOPS examinations, maintaining a valid instrument rating, renewal of the instrument rating, extensions and actions in the event of failure or noncompliance.

While preparing the research paper which led to this article, a survey regarding the future of the Army's annual writ was conducted. It addressed 21 specific points with regard to the writ and space was provided for comments on each point. Responses were received from 171 field grade aviators averaging 10.5 years as Army aviators and 3,100 hours, and 50 warrant officers averaging 11 years rated and 4,100 hours.

No attempt was made to solicit comments from the newer generation of Army aviators for it was felt that aviators who had been exposed to the writ for 8 to 10 years would provide more meaningful answers and that many of the newer aviators, as most aviators, were exempt from taking it during Vietnam service . . . thereby reducing their experience level.

The group surveyed represents only 1 percent of all Army aviators —active, Reserve, National Guard and DA civilians. However, it is closer to 5 percent when only aviators rated for more than 7 years are considered. This fact, coupled with the very selection of the aviators

for the courses they were attending, must be weighed carefully in evaluating the conclusions drawn. The 19 most significant conclusions made as a result of the specific points queried in the survey are contained in the accompanying figure.

Opinions of field grade officers and warrants were surprisingly consistent and were in substantial variance only in three areas. Specifically, 75 percent of the field grades favored addressing all questions on the exam versions in the study guide but only 52 percent of the warrants agreed. Further, the warrant officers liked the current format of the study guide better (86 percent vs. 63 percent) but were less enthusiastic about its becoming a programed text (30 percent vs. 48 percent). Lastly, only 73 percent of the field grades supported the administration of the writ primarily by examiners as compared to 88 percent of the warrant officers.

Over 2,000 comments were received on the various questions as well as areas not specifically queried by the survey. Some of the most thought-provoking comments were:

• Couldn't the U. S. Army Agency for Aviation Safety (USAAAVS) provide experience data on accident cause factors falling into the general purview of the exam's coverage?

• The administration of the exam has been poorly managed in the past at some installations and in some units.

• Current regulations regarding the annual writ are confusing, out of date in some areas and not rigidly enforced in many cases.

• Valuable feedback could be obtained regarding the writ by surveying all or part of the Army aviation community in conjunction with its administration.

• The study guide is not used at all by many aviators whose only time spent on the writ is the few hours required to take an examination version. Many teaching points, i.e., new regulations and procedures, are not really learned or understood.

In view of the brief overview of the background of the writ, programs of the other services and the survey's results, three options appear to be available regarding the future of the writ.

Option 1. Do away with the annual writ altogether. There are two valid reasons why this option, which would place the responsibility for updating and evaluating aviators at unit level, should be rejected at the outset. First, the need for annual review and updating of Army aviators is greater than ever before.

This is due to the increased emphasis on an all rotary wing force, the transition from a wartime to a peacetime Army, the large number of tactical ticket holders aspiring for standard cards, the ever-increasing complexities of instrument flight and the large number of aviators that will be placed in an excusal status. Second, the survey's results clearly indicate that most experienced Army aviators support and recognize the requirement for some type of annual writ, as, of course, do the Air Force, Navy and Marine Corps.

Option 2. Continue without changes. This option does have the advantage that the current writ is an established, if not entirely proven, system. Further, there is sufficient flexibility within its current structure to offset some of its disadvantages as indicated by the

Survey Conclusions

95 percent favor some type of annual written examination.

69 percent support coverage in the study guide of each teaching point in the examination versions.

68 percent favor the current programed text format of the study guide.

A plurality, but not a majority, favors the preparation of the study guide as a programed text (44 percent for; 28 percent against; and 28 percent did not answer).

83 percent favor the length and composition of the current study guide.

64 percent prefer an examination made up of most, if not all, self-contained questions.

88 percent favor the areas currently covered by the writ and the respective emphasis placed on each.

90 percent support the current multiple choice format used.

Of three choices—Vietnam, CONUS or rotated worldwide—51 percent favor the latter option with regard to the area for the VFR portion of the exam.

62 percent favor the inclusion of International Civil Aviation Organization rules and Federal Aviation Administration procedures in some manner in the annual writ.

76 percent favor the provisions of AR 95-1 regarding the action to be taken if an aviator fails to complete the annual writ.

81 percent favor the provisions of AR 95-63 which require the aviator to complete the annual writ within 90 days of reporting into a flying job after a tour where the exam requirement was waived.

77 percent support administering the exam open book to both instrument and noninstrument rated aviators.

81 percent favor 80 percent as the passing score.

80 percent favor continuing with two fixed wing and two rotary wing versions of the examination.

78 percent support the current retake policy in the event of failure (AR 95-63).

85 percent favor the current procedure of administering the exam to all aviators except those with waivers or returning to flying duty from assignments with waivers in the last 3 months of the fiscal year.

76 percent favor the administration and control of the annual writ whenever possible by instrument examiners.

78 percent oppose incorporation of any type of aircraft dash 10 test as part of the annual writ.

81 percent agree with the references used as the basis for the writ.

survey results. For example, problem areas such as poor administration, the fact that many aviators do not look at the study guide and the apparent lack of adherence to pertinent regulations could be eliminated by increased command emphasis and interest at all levels.

There are, however, some good arguments for not continuing with the writ's present structure. The shift to rotary wing operations and the excusal program are significant changes within Army aviation and must be evaluated. The survey results tend to support the premise that the current writ, which has changed little in over a decade, is not now accomplishing its stated purpose. The problems associated with its administration cannot be sidestepped any longer. And lastly, the professionalism and "no-nonsense" approaches of the other services with regard to standardization and proficiency programs, specifically annual written examinations, and the success of these programs cannot be ignored.

Option 3. Change certain aspects of the annual writ. The option is not whether to change the writ but rather what changes can and should be made. Nineteen specific conclusions fell out of the survey and several other considerations were surfaced. Not all of these areas require change nor are some of these areas significant issues (though the conclusions should be of interest to those charged with the preparation of future writs). In the interest of brevity this article addresses the five areas considered most important as a result of the survey and the analysis of the program of the other services. The recommendations offered at the end of this article deal with these areas only.

When should the examination be administered? The Army is the only service that schedules its annual written examination during a specific time period rather than in connection with instrument rating renewal. Yet, with the waiver of the exam during service in Vietnam and the new excusal policies, the exam is now being administered on a year-round basis to meet the requirements generated by aviators returning to flying positions from waivered status. There is a real advantage in administering the exam at the time of instrument renewal, particularly if it can be given by the examiner who also will conduct the flight check. This change should not create a significant burden for the various airfield operations and aviation units in view of the large number of aviators programed for excusal status. I agree with the survey's comments that favor all aviators taking the writ. But this is not now the policy. It is recognized that if aviators in excusal status are required to take the writ, a program administering the exam at the time of instrument renewal (birthday) could impact adversely on some airfield operations and units. However, it should be noted that the survey results support the continuance of the current policy of administering the exam to the majority of Army aviators in April, May or June.

Format of the study guide. The survey's results and the success of the Air Force program suggest the publication of the study guide as a programed text. The Air Force programed text also includes extracts from various references and serves as its own reference data booklet. Based on my experience I believe that the study guide and reference data booklet could be readily combined into such a programed text. Certain hard-to-get references used in the preparation and administration of the current examination, such as the various ARs, TMs and FM 21-26, could be readily extracted for inclusion in such a document (as could applicable ICAO and FAA procedures). A programed text published every few years and updated only as required would be cheaper than the current procedure of annually publishing a new study guide and reference data booklet.

The actual taking of an examination, however, could require additional reference material. Such references might be the FLIP documents, ARs, TMs, etc., themselves; or could be published as part of the examination booklet(s); or be incorporated into a separate RDB distributed in limited copies to various installations or units charged with administering the exam. The introduction of mandatory ground school training (discussed below) prior to taking the writ would virtually negate problems in this area.

With any programed text, as with the current study guide, the problem would remain as to how to get the aviator to take it or use it for review. One solution would be to make its completion mandatory prior to taking the exam. But, if it were to be published every few years, this would not be feasible. A second solution would be to combine this study guide/programed text with mandatory ground school instruction as a supplement or complement to it (similar to the Air Force program). The completion of the text would then be required only of those aviators whose attendance at such a ground school was not possible. The document should be a part of the aviator's professional library and thereby available to him for both review and use in conjunction with the mandatory training.

Mandatory classroom training. This would not have been feasible in the past perhaps because it would have been difficult for many aviators to attend such training. Still, these are the aviators now exempt from taking the writ under the excusal program. Only those aviators flying . . . not excused from meeting proficiency mini-

Crewmembers of some Marine aircraft such as these C-130 crews are checked by separate Marine training squadrons located one on each coast

U. S. Navy photo

mums . . . are now required to take the exam, as well as those (though excused) serving in aviation related assignments.

Such a ground school conducted (as the Air Force's) for 2 days to include the administration of the examination, monthly or bimonthly, should not be a problem or burden for aviation units and/or airfield operations in view of the excusal program. The benefits that would accrue are truly significant: standardized training covering not only examination subjects but also related material; virtual elimination of the problems now associated with the administration of the exam; economical use of reference materials; and facilitation of the return to flying of aviators coming off excusal status.

Number and format of examination versions. This depends primarily on if the mandatory classroom training concept is adopted. If it were, then one (or at the most two) versions of 50-to-100 questions would suffice, similar to the Air Force's program. The passing score also would depend on such a change. But, it is unlikely that anything but the current, multiple choice format could be employed. In event of failure the aviator would either retake the same examination after further training or the other versions if appropriate. Most of the aviators surveyed favored four versions—two fixed wing and two rotary wing—but responded without any consideration of the impact of a mandatory ground school.

Combining the writ with dash 10 type testing. NATOPS does this but the Air Force does not. The NATOPS program, as fine as it is for the Navy and the Marine Corps, does not have significant application to the Army due to its emphasis on the particular aircraft. The survey results also did not support any combining of the two types of testing. Further, the Air Force has had considerable success with its program, which staggers instrument proficiency testing and aircraft proficiency testing at 6-month intervals.

Of course there are many alternatives with regard to the future of the writ, but the issues discussed here can best be considered in the light of the three basic options now available. Option 1, doing away with the writ, was rejected at the outset. Option 2, that of essentially maintaining the status quo, does not fully satisfy today's requirements and it is unlikely that it will meet the requirements of Army aviation in the future. The basic conclusion, then, is that the format and scope of the annual writ should be changed to meet the specific requirements of the 1970s.

Having covered the five most important areas, I urge that the annual writ and the pertinent regulations governing its administration be changed as follows:

- Administer the writ in connection with instrument renewal instead of primarily in April, May and June (unless the aviator has no rating or it has expired, then administer it during some interval prior to his birthday).
- Publish a programed text, similar to the Air Force's, to be retained by each Army aviator. Such a text would be updated only as required and would replace the current annual study guide and reference data booklet.
- Require mandatory ground school before administering the exam and use the programed text to supplement that instruction and to serve as the primary training vehicle for those aviators unable to attend such a ground school.
- Reduce the number of examination versions to no more than two.
- Not incorporate dash 10 type testing with the annual writ.

I feel that with the adoption of these recommendations it will no longer be a case of "whither the writ." On the contrary, the writ will be on course with the changing 70s.

— PRESE

The 1973 A

The Colorado Mountains below are an important part of th

Major Paul

Department of Standards and

TODAY THE ARMY aviation program is geared to total aviator instrument proficiency. In other words, Army aviators—regardless of the type of aircraft they fly—are given a more complete course of instruction in instrument flying to attain an instrument rating. Aviators are trained to fly in instrument meteorological conditions to increase overall mission effectiveness. In effect, the scope of Army aviation has been broadened.

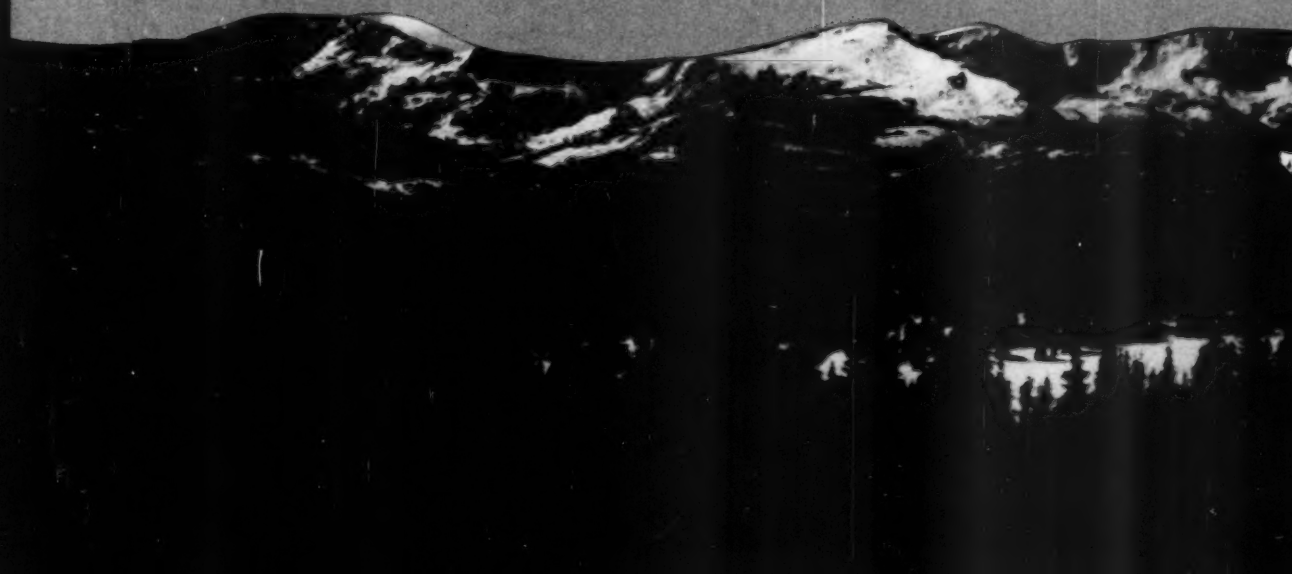
With this thought in mind, the 1973 Army Aviation Annual Written Examination is aimed at informing the modern professional Army aviator and enhancing his capabilities. This examination incorporates many changes found in the new AR 95-1. (Questions relating to the new AR 95-1 were derived from the final draft copy which was sent to the printer. Small differences such as pagination could arise between the references to the draft copy and the final regulation).

The new regulation is a consolidation of AR 95-1 and AR 95-2 including all their regular and TWX changes. Close scrutiny of the new AR 95-1 will be necessary to answer questions relating to weather requirements for instrument flying.

By the time the examination is administered a new AR 95-63 also will be published. Questions relating to this new regulation are not portrayed in the 1973 annual written examination. Since last year changes also have occurred in TM 1-300, Meteorology for Army Aviation (Change 4), and TM 1-225, Navigation for Army Aviation (Change 1).

Most questions are derived from publications that the pilot would readily have access to while flying or flight planning. The entire examination is presented in a manner similar to an oral examination one would receive from an instrument examiner prior to receiving an annual instrument checkride.

The 1973 Army Aviation Annual Written Examination contains questions and material relating primarily to the Denver area. Characteristics of the Denver area (enroute low altitude, chart 6) include high mountainous terrain, flat plains, congested metropolitan areas and uncontrolled elsewhere areas. Magnetic variation in this area is nearly 13 degrees east. This much magnetic variation becomes



SENTING —

Annual Writ

f this year's Writ which relates primarily to the Denver area

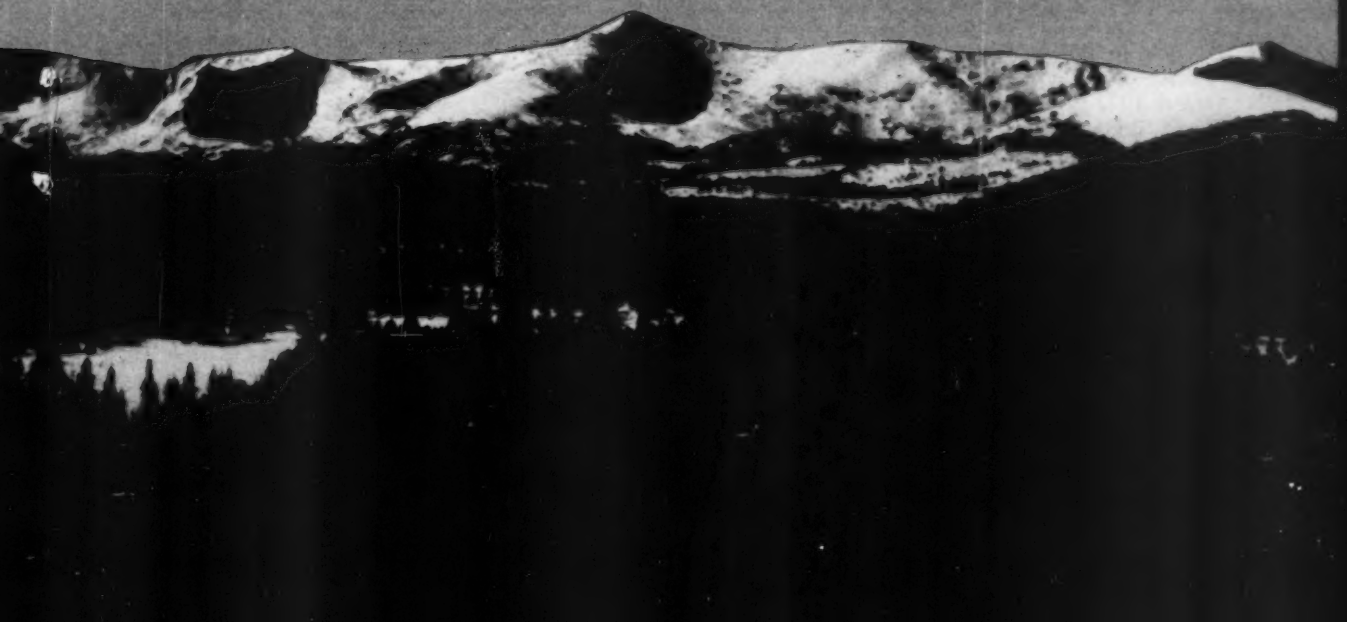
Paul G. Lurich
and Instructor Training, USAAVNS

an important consideration in that winds associated with teletype sequence reports are given in terms from true north. Meticulous attention must be given to the minimum enroute altitude (MEA). Many MEAs west of Denver would require the use of oxygen. Density altitude consideration also must be considered. The Federal Aviation Administration issues recommended routes for VFR flying to the west in the mountains. Due to the remoteness of some parts of this area consideration also should be given to survival situations.

The 1973 Army Aviation Annual Written Examination is comprised of several publications. The Reference Data Booklet is a consolidation of pertinent extracts from FLIP, Section I and Section II; IFR Supplement; VFR Supplement; Low Altitude Instrument Approach Procedures (Vol-5); and two fold-out area charts (Denver and Kansas City). Material presented in the Reference Data Booklet is extracted from the 17 August 1972 issue of FLIP. Present FLIP material may have more recent changes, however, the examination is predicated on the Reference Data Booklet. The Denver sectional aeronautical chart and the FLIP enroute low altitude (chart L-6) are also used as references.

The Study Guide for this year's examination is presented in a "checkbook" size, incorporating a one-time-through feature. This program text should be completed prior to taking the actual examination. The examination itself is presented in four versions. Versions I and II are oriented primarily toward fixed wing flying; versions III and IV contain rotary wing questions. The Examination Instructions and Reference Lists Booklet contains the administrative procedures for administering the examination.

Take the 1973 Army Aviation Annual Written Examination seriously. A sincere effort to answer each question correctly will ensure not only a passing grade but also a much better understanding of existing regulations. Any questions that are not correctly answered should be reviewed to ensure that you fully understand the changes to appropriate publications. The time you spend taking the examination should be used for the purpose of updating your knowledge of flying regulations. Use it wisely!



New Semitrailer

Myron Wolfe, DAC

A NEW SEMITRAILER mounted petroleum testing laboratory is now on order for U. S. Army use. The prototype has already been produced and delivered and the first production models are due to be delivered in mid-1973.

Designed to replace the H-200-D laboratory, the new equipment will be able to make all the tests required by MIL-HDBK-200D, 1 March 1971, Military Specification Hand Book Quality Surveillance for fuel, lubricants and related products. The airmobile laboratory for testing military aviation fuel in the field is limited in the tests it can make (see AVIATION DIGEST, July 1972). The semitrailer testing laboratory is a completely self-contained unit requiring only an external power source, a water supply and a waste water disposal facility when in operation. It is housed in a standard XM822, 4 wheel, 10 ton semitrailer van.

The van is divided into three compartments. The front or utility compartment contains the air conditioner, heater unit, compressed air system, vacuum system, pressure water system and related piping and ducting.

The utility compartment is completely separated from the laboratory compartment by the fume hood, gum bath area, refrigerator and cabinets forming the front wall of the laboratory. Access to the utility compartment is gained through the forward curbside door. The central or laboratory compartment has three stainless steel covered counter and cabinet areas. Special laboratory equipment is installed on countertops and adjacent walls and stowed in cabinets and drawers.

The rear compartment houses a knock-testing engine, its controls and the blending kit. The carbon dioxide icemaking machine, propane, oxygen and carbon dioxide cylinders are located along the roadside wall. Access to the rear compartment is through a door in the partition which forms the laboratory rear wall or through the door in the van rear wall. Purging ducts run the length of the van ceiling from the utility compartment to the rear compartment.

The van exterior incorporates various items peculiar to the petroleum testing laboratory. A muffler and special vent ports are provided on the curbside rear exterior wall to be used with the knock engine and the exhaust fans located in the rear compartment. A water inlet is located on the roadside rear wall. Roadside and curbside compartments on the van undercarriage provide external storage of fuel cans for use with the knock engine. The curbside compartment holds two 5 gallon cans and the roadside compartment holds three 5 gallon cans. Another roadside compartment provides space for a garden hose, tarpaulin, van grounding rod and the power entry cable. A toolbox is also mounted on the undercarriage at roadside.

The petroleum van is equipped with a 110 volt and a 220 volt electrical system. The 110 volt system provides power to the interior lighting and to laboratory equipment requiring this voltage. The 220 volt system is used for the air conditioner, heating system and laboratory equipment requiring 220 volts. A power entry receptacle and a time clock for van purging are located on the rear roadside van exterior. The operation of the new laboratory requires a minimum of 60 KW, AC, 60 HZ, 120/208 volts electrical power.

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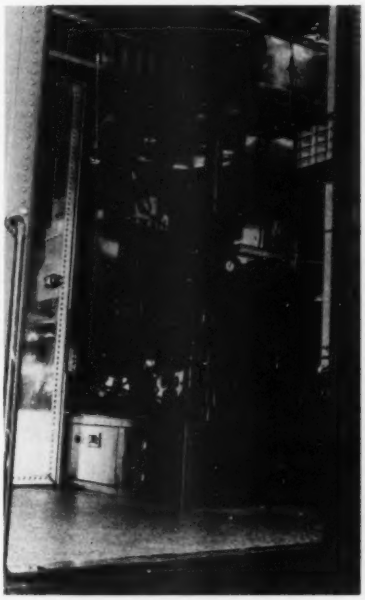
The van is divided into three compartments. The front or utility compartment contains the air conditioner, heater unit, compressed air system, vacuum system, pressure water system and related piping and ducting.

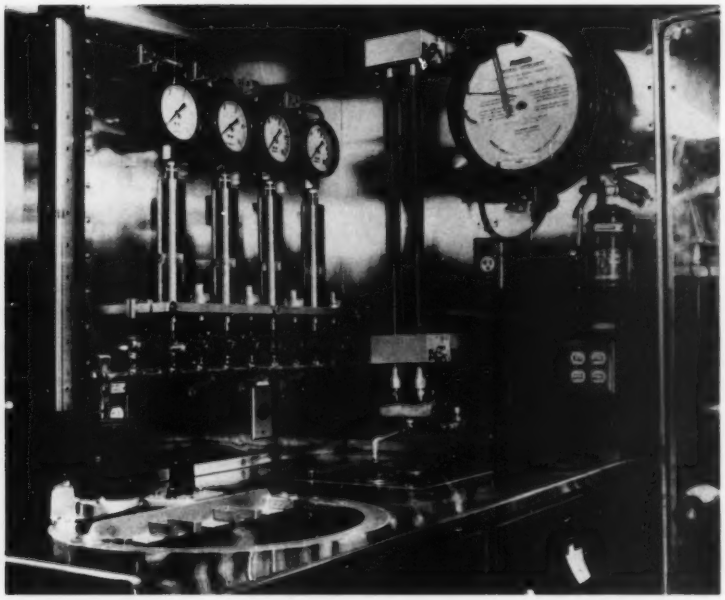
The utility compartment is completely separated from the laboratory compartment by the fume hood, gum bath area, refrigerator and cabinets forming the front wall of the laboratory. Access to the utility compartment is gained through the forward curbside door. The central or laboratory compartment has three stainless steel covered counter and cabinet areas. Special laboratory equipment is installed on countertops and adjacent walls and stowed in cabinets and drawers.

The rear compartment houses a knock-testing engine, its controls and the blending kit. The carbon dioxide icemaking machine, propane, oxygen and carbon dioxide cylinders are located along the roadside wall. Access to the rear compartment is through a door in the partition which forms the laboratory rear wall or through the door in the van rear wall. Purging ducts run the length of the van ceiling from the utility compartment to the rear compartment.

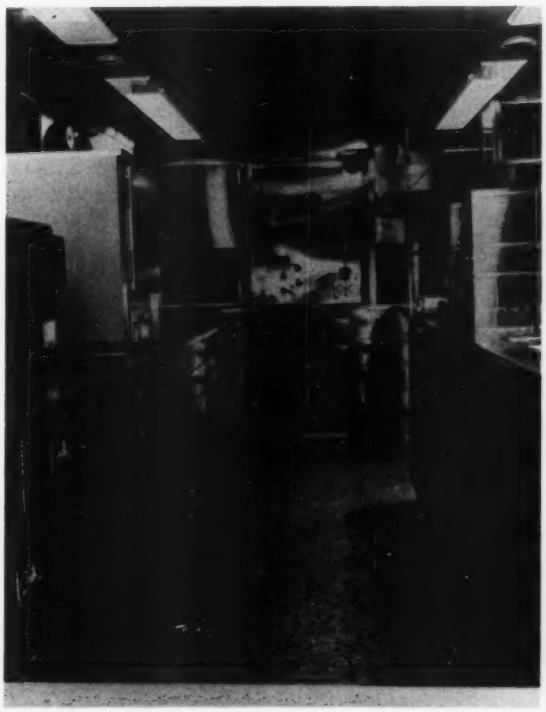
The van exterior incorporates various items peculiar to the petroleum testing laboratory. A muffler and special vent ports are provided on the curbside rear exterior wall to be used with the knock engine and the exhaust fans located in the rear compartment. A water inlet is located on the roadside rear wall. Roadside and curbside compartments on the van undercarriage provide external storage of fuel cans for use with the knock engine. The curbside compartment holds two 5 gallon cans and the roadside compartment holds three 5 gallon cans. Another roadside compartment provides space for a garden hose, tarpaulin, van grounding rod and the power entry cable. A toolbox is also mounted on the undercarriage at roadside.

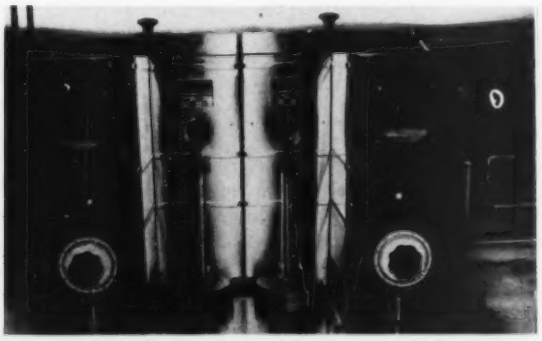
The petroleum van is equipped with a 110 volt and a 220 volt electrical system. The 110 volt system provides power to the interior lighting and to laboratory equipment requiring this voltage. The 220 volt system is used for the air conditioner, heating system and laboratory equipment requiring 220 volts. A power entry receptacle and a time clock for van purging are located on the rear roadside van exterior. The operation of the new laboratory requires a minimum of 60 KW, AC, 60 HZ, 120/208 volts electrical power.

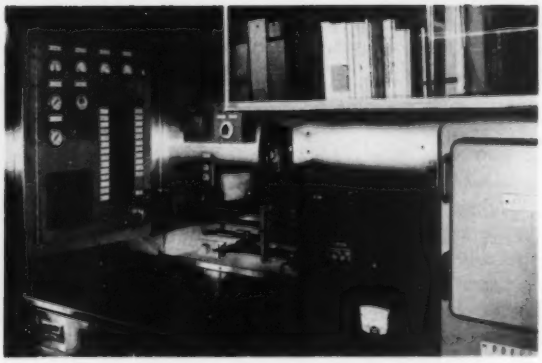




The trailer's rear compartment houses a knock-testing engine, its controls and the blending kit (above left). The Reid vapor pressure testing equipment and gasoline gum testing equipment are installed on walls and cabinet tops (above right). Stainless steel equipment and cabinets line the interior as viewed from the rear (below left). Also found in this section of the trailer is the gasoline distillation equipment (below right, top) and the electrical panel board and trailer library (below right, bottom)







Maintenance

When Rigging Tail Rotors

Rigging Of The Tail Motor: When rigging or changing the tail rotor chain sprocket on UH-1 aircraft they must be changed as a matched set (chain and sprocket). Reference: TM 55-1520-210-20, chapter 9, section 3, paragraph 9-69.

Battery Relay: A fast and easy way to determine if the aircraft battery relay is the cause of a complete electrical failure on the UH-1 aircraft is to press the transmission oil level light switch on the right side of the transmission. If this light does come on, the cause of the electrical failure could be the battery relay. Reference: TM 55-1520-210-20, chapter 12.

Honeycomb—Use Caution! Use extreme caution while changing the low pressure sensing switch, high pressure sensing switch, oil flex hose and oil tubing on the OH-58A transmission deck. The sharp ends of an open end wrench may puncture small holes in the transmission deck allowing oil and water to enter the honeycomb. This contamination will deteriorate the honeycomb structure resulting in replacement of the transmission deck. Reference: TM 55-1520-228-20, dated 7 Oct 70, change 6, dated 12 Nov 71, figure 7-8.

Start Fuel Solenoid: When removing the start fuel solenoid valve assembly, be sure all electrical power is disconnected. Reference: TM 55-1520-210-20, chapter 5, section 5, paragraph 5-173.

UH-1 Battery Voltmeter Circuit Breakers: When installing a battery in the UH-1D and H model helicopters in either location, front or rear, some maintenance personnel will open the voltmeter circuit breakers at the opposite location. This circuit breaker protects the D.C. voltmeter only and has no effect on battery power except to the voltmeter or battery relay and should not be opened just because the battery is not installed in that location. Reference: TM 55-1520-210-10, dated 10 Sep 71, figure 13-19, page 13-91.

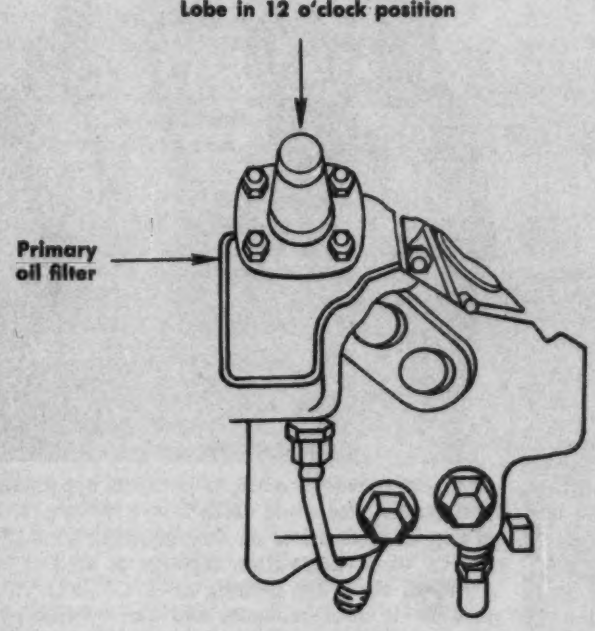
Cleaning T-53 Engines: When internally cleaning the T-53 engine, special care must be taken to ensure the job is properly done. Some maintenance personnel are merely opening up the engine cowling, and particle separator and then just dumping in solvent, or abrasive grain. It cannot be emphasized enough that chapter 7, pages 7-1 through 7-8 of TM 55-2840-229-24 specifically points out that various hoses, lines and subassemblies must be disconnected to protect these components from damage. By following procedures as outlined in chapter 7 of TM 55-2840-229-24 we can efficiently do our job and save the Army the unnecessary cost of repairing or replacing engine damage due to improper cleaning techniques.

Transmission Primary Oil Filter: The transmission is provided with an oil filter mounted in a pocket in

Matters...

the upper right aft corner of the sump case with inlet and outlet through internal passages. The filter assembly consists of a stack of wafer-discs screens assembled with spacers on a preformed tube, incorporating a bypass valve for continued oil flow if screens become clogged.

One should note the filter must be installed with the lobe or boss on the face of the casting in the upper or 12 o'clock position, or the internal oil passages will not aline with the bypass valve allowing the oil to flow if the wafer-discs assembly becomes clogged. Reference: TM 55-1520-210-20, paragraph 7-9, page 7-31, dated Sep 71; TM 55-1520-220-20, paragraph 7-48, page 7-27, dated Nov 68; TM 55-1520-219-20, paragraph 7-43, page 7-29, dated Jan 69 (see illustration).

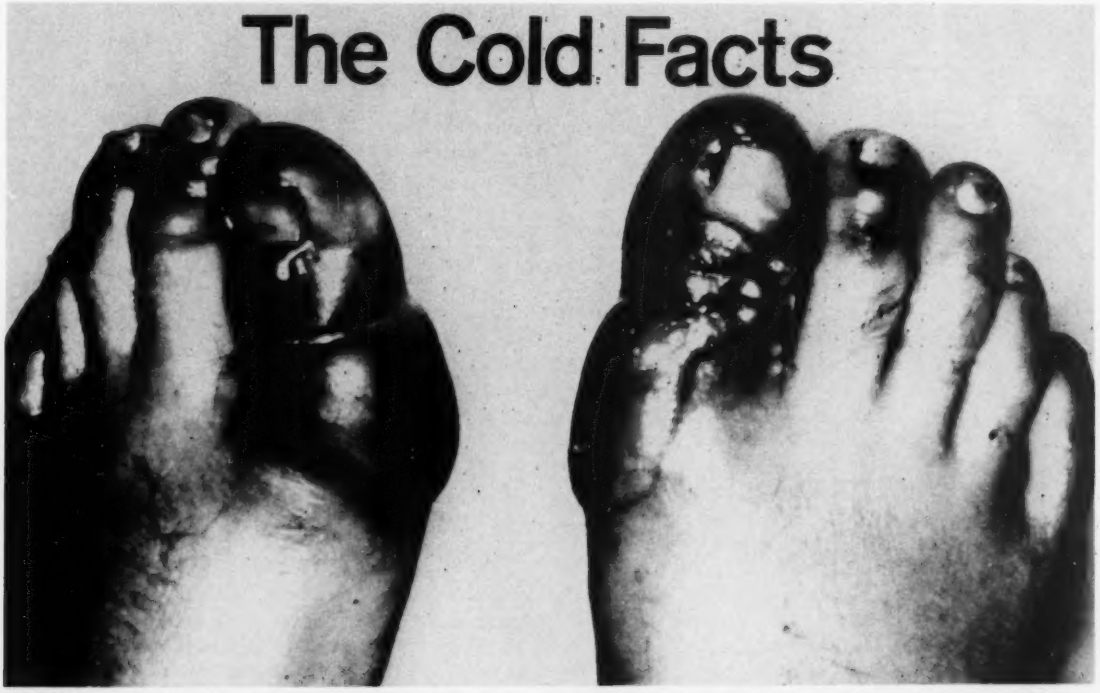


Sump case UH-1 transmission

U-21 Temperature Control Circuit Breaker: When maintenance is being performed on the U-21 that requiries electrical power, the temperature control circuit breaker is frequently pulled. This circuit breaker controls the combustion air blower which is designed to keep the avionics compartment cool. If any of the avionics equipment is turned on, this breaker should not be pulled so as to prevent serious damage to the avionics equipment due to overheating. Reference: TM 55-1510-209-10/1, page 6-1, paragraph 6-6.

Do you know the different types of cold injuries and the treatment for each? If, on your last flight, you had been forced to make a landing in a remote area in sub-zero temperatures, could you have survived the weather until rescued? Would you have had ample clothing, survival equipment and knowledge of what to do? If there are any questions in your mind concerning winter survival, maybe you ought to get . . .

The Cold Facts



YOU DON'T HAVE to go to Alaska or to the wastelands of the Far North to sustain cold injuries. Chances are excellent that you can do a pretty good job right where you are. During a single winter in one Army area in the "Sunny South," 75 men were either hospitalized or confined to quarters because of cold injuries. And this figure does not include those individuals who experienced minor frostbite but did not report for medical treatment.

The three most common types of cold injuries are hypothermia, frostbite and trench (immersion) foot. When the entire body is exposed to cold to the point that vital functions cease, it is called hypothermia. Frostbite is local tissue death from exposure to cold at temperatures below the freezing level. Trenchfoot is local tissue death from exposure to cold at temperatures above the freezing level. Of these, minor frostbite is most common, and can be likened to sunburn. It is preventable and usually results from personal negligence. Since, in most instances, it is considered a non-line-of-duty injury, many individuals suffering minor frostbite do not report for treatment.

Although some people can tolerate cold better than

Ted Kontos
Directorate for Education and Prevention
USAAAVS

others, no one is immune to cold injury. An individual's ability to withstand the cold depends, in part, on the amount of fat that lies beneath his skin. The greater the thickness of this layer of fat, the greater the insulation against heat loss—one of the few advantages a fat man has over a thin one. A person's susceptibility to cold injury is also affected by his medical history. If he has previously suffered some type of cold injury, such as frostbite, his chances of sustaining cold injuries under conditions of extreme exposure are greatly increased. However, an individual's tolerance to the cold is not affected by his moving from a warm climate to a cold one or by a sudden change of the seasons, although it may require a period of two or three weeks before his body becomes acclimatized to the cold.

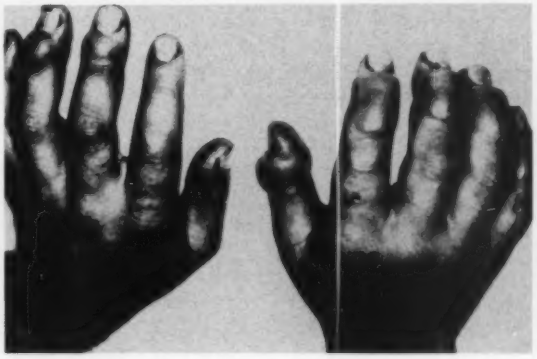
A person suffering from hypothermia usually cannot help himself and must be assisted. He must be warmed immediately if he is to survive, preferably by exposing him to temperatures of about 120 degrees F. This may be accomplished by using warmed water (feels warm to skin on forearm) or a warm room.

In the case of frostbite, the patient can help himself and should do so as quickly as possible. The affected area should be warmed to about 90 degrees to 140 degrees F. This can be done in front of a fire or possibly by placing the injured extremity against or between other parts of the body. The affected area, however, should *not* be rubbed as this may cause further tissue damage.

First aid for trenchfoot is similar to that for frostbite except that the injured part should be warmed to 70 degrees to 80 degrees F. After warming, it should be protected with dry dressing and the patient treated as a litter case.

Obviously, a downed aviator is not likely to find a warm room, hot bath, water, fire or any kind of prepared shelter awaiting him after he lands his aircraft or ejects over snow-covered wilderness. If he is not prepared to cope with the elements, his chances of making it back to civilization alive are about the same as those of the proverbial snowball in that hot place. All preparations must have been completed *before* takeoff, but deciding what preparations are in order is not always a simple matter.

It is pretty hard for an aviator in an area of relatively mild winter weather to envision what he should wear in 4-foot snowdrifts and a -20 degree temperature. Yet this may be exactly what he must do. In some parts of the Southwest, for example, he may be in a desert area where the thermometer registers a sultry 90 degrees, while 10 minutes away, the temperature may be below freezing. Nor should he forget the chill factor. The higher the wind velocity for any given temperature, the lower the equivalent temperature. At 5 degrees F. under no-wind conditions, a person can remain reasonably comfortable with normal precautions. With a 2-mph wind, he will experience discomfort, particularly on overcast days. If the wind velocity reaches 8 mph, it becomes bitterly cold and uncomfortable even on clear sunny days. At 16 mph, the wind can cause exposed human flesh to freeze and life in a temporary shelter to become highly disagreeable. Should wind velocity rise to 35



THE COLD FACTS

mph, exposed flesh will freeze in less than one minute and stringent survival efforts will be required to sustain life. *All preparations for winter survival should be based on the worst weather conditions that can be expected along the proposed flight route.*

Extreme operations in arctic areas have given man much valuable experience in cold weather survival. *Armed with initiative, knowledge, proper clothing and necessary survival equipment, he can survive almost indefinitely in the most frigid climate.* Yet, a downed aviator generally needs only to manage to survive for a relatively short time to be rescued. Even in the most remote geographic areas of the world, the average time lapse before being found is 5 days.

What should you do if you are downed in freezing weather? Heading the list are four big DO's. Stay near the aircraft, get out of the wind, build a fire and keep dry. Having the capability to build a fire is most important.

Although you will have to survive the elements, you also want to be rescued as soon as possible. It is generally much easier to locate an aircraft than to spot individuals. So stay with the aircraft unless you *know* you can reach help. But *don't* stay *in* the aircraft. It will be like a deep-freeze unit.

Next, get a fire going—before your hands and fingers get so numb you can't even strike a match. Standing dead trees make the best firewood because they are reasonably dry. They also produce less

WIND CHILL CHART

WIND VELOCITY Miles per Hour										
45	35	25	A 20	15	10	5	3	2	1	0
TEMPERATURE Degrees Fahrenheit										
90°	89.5°	89°	88.5°	88°	88.7°	87°	87°	86°	84.5°	83°
82	81	80.5	80	79.5	78	71	74	72.5	70	60
72	71	69.5	68	67	65	60	57	53.5	47.5	23
63	61	59	57	55	52	44	39	34.5	20	-11
51	49	47	45	42.5	38	28	18.5	11	0	-27
41	39	36	B 34	30.5	25	11	0	-9	-23.5	C -38
30	28	25	23	18	11	-5	-16.5	-40	Below -40	Below -40
20	18	14	11	6	-2	-19	-40	Below -40		
10	7.5	3	0	-6	-15	-35	Below -40			
0	-2.5	-8	-12	-18	-29	Below -40				
-11	-14	-18	-23	-30	Below -40					
-21	-24	-30	-35	Below -40						
-32	-35	-40	-40							

Instructions for use of table (zero humidity factor):
1. First obtain the wind velocity and temperature forecast data.
2. Locate the column closest to the expected wind speed.
3. Read down to the temperature closest to the expected temperature.
4. Follow across on the same line to the last column in the chart.
5. This figure is the approximate equivalent temperature reading.

For example: The expected wind speed at a given time is 20 mph and the expected temperature is 34° F. Locate the 20 mph column (A) and follow down to the temperature 34° F (B). Move all the way to the right on the same line to the zero (0) wind speed column at -38° F (C). This means that with wind speed of 20 mph and a temperature of 34° F, the rate of cooling for all exposed flesh is the same as at -38° F with no wind.

smoke. Once you get a fire started, you can use damp wood, if necessary. To get maximum benefit from your fire, you should make some sort of reflector to radiate the heat toward you. One can be fashioned from trees, logs, metal from the aircraft or from virtually any material that is available.

A shelter is another necessity. It is needed to protect you from both wind and rain. It does not have to be elaborate. A simple lean-to will do the job. You can also use snow to build three walls adjacent to each other (as if building an igloo) and then stretch your parachute, if you have one, over the structure. If the snow is deep, you can fashion a wall of snow, as described, then dig down below it—anything to get you out of the wind and keep you dry.

With a fire going, now is the time to dry off. Getting dry and staying dry are important in preventing cold injuries—and death—from freezing temperatures. But don't lie on bare ground. You need insulation beneath you as well as above you. Line the ground with plenty of boughs and place your sleeping bag on top of them. Also, deep snow makes an excellent insulator. Bear in mind that pine and spruce, which are most abundant in northern climates, will cast an abundance of sparks a distance of 5 or 6 feet when burned. Also the smoke produced from a fire in a closed shelter can cause severe headaches and swollen and inflamed eyes. Headaches, however, will disappear after a short time outside. Unless you are alone, it's a good idea to always have someone awake to tend the fire and act as fire guard.

You may also be faced with other problems. Statistics show that in survivable crash landings, approximately half of the aircraft's occupants will sustain some type of injury. Broken bones and shock are common to crash victims. Don't attempt to set broken bones. Instead, immobilize them by fashioning splints. Keep an injured person warm to protect him from freezing as well as to treat or prevent shock. Here, again, the sleeping bag or a facsimile (rolled up parachute) can be a real lifesaver. Remember, also, that a person in shock will require more water than he would normally need. Unless a supply is available, always melt snow to get water. Eating unmelted snow not only will cause chapped lips, faces and tongues. but since snow contains little water, it will actually increase thirst and bring on parched and burning throats. If you have no utensils, one way of melting snow is to heat a flat rock that has a depression in it, then pile snow on top of it.

Snow blindness can also present a problem. Chute

webbing or any kind of fabric can be used to fashion snow goggles by simply slitting a 2-inch-wide strip to fit over the eyes and then tieing it around the head. Should snow blindness occur, remember, it is a temporary condition. Heat packs will help, but complete darkness is required, usually for two or more days.

Obtaining food may be another problem, especially if you are not rescued soon. If you have a firearm. good. If not, you can fashion snares and traps to catch small animals. Weakness from exhaustion and lack of nourishment is a common occurrence. To help minimize it, avoid walking or working in deep snow as much as possible. If the snow is deep and you must move about, fashion some type of snowshoes. Trying to walk through deep snow without them will require a great expenditure of energy, promoting exhaustion.

Despite your best efforts, your chances of surviving may hinge on one important factor—your mental attitude. Its importance can be dramatically shown by briefly reviewing the case history of an aviator forced to bail out over frozen wastelands. This man landed safely, and did everything right. He established a campsite, built a fire, etc. All he had to do was wait to be found. Instead, from despair, loneliness and possible thoughts of the futility of his predicament, he used his .45 to commit suicide. Rescuers reached him within 24 hours after he had bailed out of his aircraft.

With proper *knowledge, clothing and survival equipment,* chances are overwhelmingly in your favor that you can survive the most bitter cold. But the time to make preparations is NOW!

Flammable Fluid and Nomex

Does Nomex material, once soaked in flammable fluids, lose its fire-resistant qualities?—ASO

According to the U. S. Army Natick Laboratory and the U. S. Army Aeromedical Research Laboratory, a Nomex flight suit retains its protective qualities if it is thoroughly washed to remove all traces of flammable fluid. The Nomex fibers do not break down chemically as a result of contact with flammable fluids, and the suit will continue to provide the protection for which it is designed after a thorough washing.

U-21 Shoulder Harness

Is there any truth to the rumor that the U-21 shoulder harness can cause serious neck injury in a crash?—Assistant AG

No. An accident severe enough to produce neck injuries very likely would produce fatal head and facial injuries as an unrestrained upper torso flails against the cockpit structure. To the contrary, in the past 5 years of U-21 accident experience three pilots sustained head and face injuries that could have been avoided had they worn the shoulder harness.

Flight Suit Repairs

Is repair of Nomex flight suits authorized and, if so, what is the proper repair procedure?—ASO

Repair is authorized provided fireproof materials are used. Chapter 7, TM 10-8400-201-23, "General Repair Procedures for Clothing and Individual Equipment," contains repair procedures for both organizational and direct support maintenance, criteria for workmanship, and a list of materials needed to perform this maintenance function. You also might be interested in the article dealing with Nomex repairs, "Your Wife Won't Do," that appeared in the August 1971 AVIATION DIGEST.

Fuel Testing

When must fuel be sent to the laboratory for testing?—Maintenance Officer

Whenever a new filter/separator is installed or after filter elements have been changed, and every month thereafter, according to TM 10-1101. In addition, fuel must be laboratory tested in all aircraft mishaps involving engine failure or suspected engine failure, or when aviation gas or jet fuel has been stored above the ground for 30 days in prevailing air temperatures of 90 degrees F. or higher and no fresh fuel has been added.

Historical Interest Items

If my unit has an aviation item of historical interest, how can we transfer it to the Army Aviation Museum?—Commander

AR 870-5 authorizes the lateral transfer of U. S. property to the Army Aviation Museum at Ft. Rucker, AL, provided that the commander of the installation at which your unit is located has designated the item as historically significant.

Accident Rates and Costs

Could you please give me a recap of Army aviation accident rates and costs for the past 3 fiscal years?—Congressional Inquirer

Total Army aircraft accident rates and costs for fiscal years 1970, 1971 and 1972 are as follows (data include both major and minor accidents):

	FY 70	FY 71	FY 72
Accident rate (per 100,000 flying hours)	16.9	14.3	11.95
No. of fatalities	528	327	279
Total accident costs	$157,100,000	$115,800,000	$48,000,000
Average cost per accident	$148,300	$163,500	$141,900

In addition, the major accident rate decreased approximately 22.5 percent during FY 72, and accident costs decreased approximately 58.5 percent during the same period. The fatality rate (per 100,000 flight hours), however, increased approximately 48 percent.

Heliport Marking Guidance

Where can I find instructions on how to mark heliports and how to set up a compass rose?—Commander

Guidance for the proper marking of heliports and airfields and for setting up a compass swing base (compass rose) is contained in TM 5-823-4, "Army Airfield-Heliport Operational and Maintenance Facilities." Appendix 12 of this TM tells you how to mark objects that may present a hazard to ground movement of aircraft at airfields and heliports.

Painting and Marking of Equipment

What regulation spells out how to paint and mark equipment used in aircraft maintenance shops and on the airfield?—Maintenance NCO

According to AR 746-5, machine tools and associated shop equipment will be painted gloss gray No. 16187 except that, at fixed facilities, such equipment will be painted semigloss green No. 24260 and with the safety color code markings prescribed by AR 385-30. Emergency stopping switches and bars on this equipment will be painted gloss red No. 11106. Equipment authorized for CONUS Army airfields by TA will be painted and marked in accordance with Federal Aviation Agency Technical Standard Order, TSO N26. Fire-control material will be painted and marked in accordance with MIL-STD-194. All vehicles except nontactical firefighting or crash-rescue vehicles will display a distinctive orange and white flag whenever operating on landing areas, runways, taxiways or peripheral roads at airfields. Additional information on color and marking of Army materiel may be found in AR 746-5 with change 1.

Crash Facts Message Symbol

I notice that according to AR 385-40 crash facts messages carry the symbol "RCS CSGPA-459 (MIN)." What does this stand for?—ASO

AR 335-11 is the authority for the symbol. The letters stand for "Reports Control Symbol, Chief of Staff for Personnel Administration." "459" is the numerical suffix and (MIN) means that the message will continue to be transmitted by electrical means under condition MINIMIZE.

Accident Report Submission

I have not received the final report on an engine which I sent to ARADMAC for analysis. Should I request an extension for submission of the accident report until the final ARADMAC report comes in?—Commander

No. Go ahead and submit the accident report without the final ARADMAC report. As a rule, the final ARADMAC report only expands on the findings of the preliminary (TWX) report. USAAAVS receives a copy of all final ARADMAC reports and will notify you should there be any resulting changes to the accident report so that you may update your files.

Turbulence Limitations

Where can I find the turbulence limitations imposed on aircraft?—Operations Officer

Section 10 of the dash 10 for the various aircraft contains restrictions and procedures pertaining to operations in turbulence. Good common sense and a high degree of caution should always be applied to aircraft operation in areas where turbulence is either known or forecast.

Major Chester Goolrick .
for the U. S. Army Agency for Aviation Safety

From any aviator's standpoint,
the weather can serve up
a double scoop of trouble . . .

UNRULY WEATHER SENSE

WHO WAS IT first said that everybody talks about the weather all the time but nobody ever does anything about it?

It *is* true most people don't do anything about the weather, including, in some cases, Army aviators. That is not to say they shouldn't *be* doing something. You *can* do something about the weather. You might not be able to change it, but you can *do* something about it.

Respect is the word, RESPECT in capital letters for what extreme weather conditions can do to anybody foolhardy enough to stick his neck out when Mother Nature is in one of her surly moods. The more vulnerable you are, the more respect is called for, and when it comes right down to getting a job done in adverse weather, you must measure the odds. Maybe postmen, as their motto has it, can keep on with their appointed rounds in the teeth of snow, rain, dark of night, or even slippery pavements without undue danger to life and limb. However, an Army aviator's absolute survival can hinge on a weather situation. Respect? You betcha. The real old pros have it coming out of their ears.

GROWING PAINS

You aren't born with much respect for anything or anybody—man, beast or nature. You develop it, more often than not, through some fairly painful experiences.

As far as weather is concerned, the unpleasant fact is that too many Army aviators haven't developed the professional respect they need because they (a) haven't fully boned up on what adverse weather can do or (b) insist on seeing for themselves in the face of sound advice from those who know their weather ropes from stem to stern. How else can you account for the fact that if you went back through the records for almost any period picked at random, you would find that unruly or extreme weather of one kind or

UNRULY WEATHER SENSE

another was a significant factor behind many Army aviation accidents?

Hurricanes don't come howling in off the Gulf with clockwork regularity, but in the course of any day's flight—anywhere—you are likely to run into some kind of weather conditions you usually think of as abnormal and which can give you trouble and some anxious moments if you are caught unprepared. Some bright soul with a head for statistics has figured out that all over the world each day there are in the neighborhood of 45,000 thunderstorms. That adds up to a lot of lightning bolts, high winds, rain, sleet, vicious turbulence and what have you. With that many storms knocking around, you can be certain that, even as you are reading this, some Army helicopter crew somewhere is preparing to cope with an ominous mass of black clouds looming up on the horizon. Or if it isn't a storm, it can be too many clouds and too little visibility. Or clear air turbulence. Or snow or fog. You name it and the weather can serve up a double scoop of trouble.

From any aviator's standpoint there are just too many kinds of nasty weather for life to be peachy-creamy. USAAAVS' statistics point to some depressing facts: In FY 1970, weather cause factors were present in 4 percent of all Army aircraft accidents, yet this 4 percent accounted for 37 percent of *all* aircraft accident fatalities. During calendar year 1972, the Army experienced 155 weather-related mishaps, resulting in 133 fatalities.

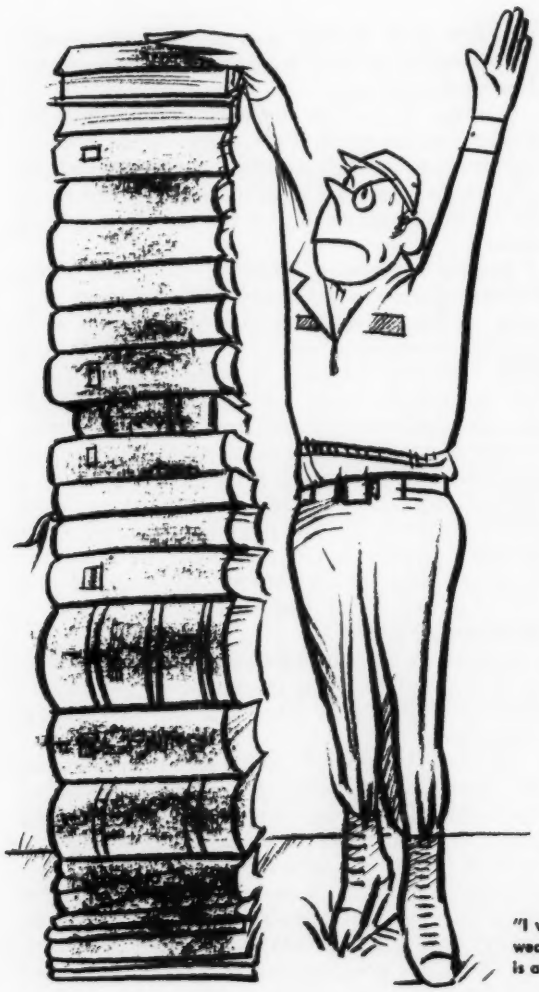
MIDNIGHT OIL

The School of Hard Knocks has a tough assortment of courses. Also, a lot of students who persist in entering flunk out long before they graduate. As far as learning to respect weather is concerned, there's got to be a better way.

There is, and a fairly simple one at that. You listen, you study, you develop knowledge and you follow the no-nonsense doctrine that you never accept a weather risk if there is a workable alternative.

You've probably sat around on more than one occasion and heard older pilots drag out hairy recollections of how they once flew from Nome to Saskatchewan through a blizzard which could have grounded Santa Claus, or ran into thunderstorm-induced turbulence which threw them around like pie plates in the hands of a drunken juggler. You'll never hear them admit that they should have been awarded the gold-plated Dunce Cap of the Year for having tried to fly in that kind of weather in the first place.

You've also probably had one or two hairy experiences you could contribute of your own. To be fair, some of them were brought on by circumstances you couldn't control or by the absolute necessity of taking an extra risk. But remember the time in flight school when you were taken aside by an instructor who spelled out for you all the facts of weather life and added a friendly warning that if you wanted to stay in one piece very long you had better pay strict heed?



"I will never accept a weather risk if there is a workable alternative!"

Can you honestly say you know enough about the weather—particularly the local characteristics in your operating area—you need to know to be the kind of safe and sane aviator Army aviation requires?

If the answer is a solid yes you can stop right here. Maybe the rest of us had better go on a step or two.

LEVEL HEAD, CLEAR SKIES

You don't have to be a Ph.D. with a degree in meteorology from M.I.T. to know enough about weather to appreciate what it can do. Adverse weather comes in a variety of interesting and deadly shapes and sizes. You could spend years learning what brings it on and the forces it can exert, and still not know everything.

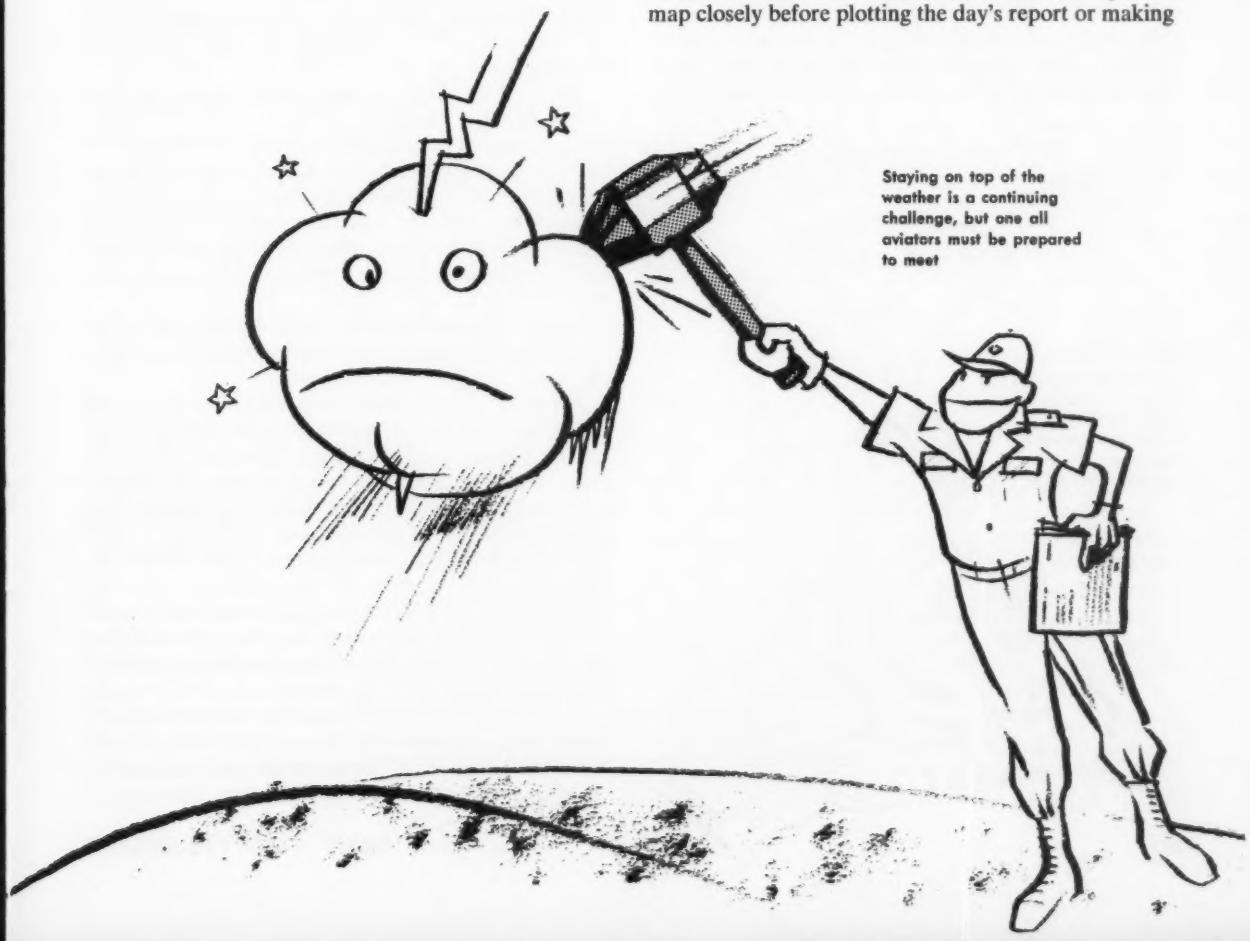
Staying on top of the weather business is a continuing challenge, but one all aviators must be prepared to meet. What you must acquire is enough professional knowledge to stay out of trouble, which is another way of saying you need a healthy respect for any kind of adverse weather.

Take the case of those 45,000 daily thunderstorms. Read about thunderstorms in any scientific journal and you'll find that they are a seething mass of forces caused by a variety of factors and that no two are ever alike. You'll read hair-raising statistics about updrafts and downdrafts in excess of 65 knots, hailstones big as golfballs, blinding rains, icing conditions, lightning and surface sheer winds which can rip up an aircraft like confetti.

You don't have to go much further to reach the sensible conclusion that the inside of a thunderstorm is a good place not to be.

Few if any aircraft accidents are brought on because pilots deliberately tried to fly through a storm. Inadvertence is another matter. With all the facilities available to the pilot today, such as weather forecasts, advisories, special advisories, pilots' reports and radar coverage, there is no reason to "accidentally" fly into a thunderstorm. One of the best protections against encountering thunderstorms in flight is being forewarned of their possible existence.

The weather map is the one absolute in this game, for it ties observation and forecasting together by showing the geographic features that are basic to the mercurial, restless weather patterns. Experienced forecasters and weather-minded aviators will eye this map closely before plotting the day's report or making



Staying on top of the weather is a continuing challenge, but one all aviators must be prepared to meet

a flight plan. This combination of all available weather information plus the pilot's knowledge, experience and good judgment should suffice as a cue to the probability of weather.

Flying a helicopter or any aircraft into a thunderstorm is foolhardy—like trying to make your points with someone else's loaded dice. If available weather data hints at thunderbumper possibilities, your weather officer confirms your suspicions and those billowy white cumulus clouds in the distance begin to look boiling, think again before you make the "go" decision.

A sound unit management program will ensure that every pilot filing a flight plan has ready access to all the latest weather information

Much has been written and even more has been recounted of the treachery of thunderstorms, particularly to smaller aircraft. Despite this, there are those pilots who do not devote enough time to the study of weather, shrug off weather warnings and go blissfully off to meet Thor. These are the pilots who learn the hard way.

The best safeguard against thunderstorm flying is a thorough and complete preflight weather briefing. It's a command responsibility to see that this type of briefing is available, and it is a pilot responsibility to get it. But pilot responsibility for avoiding thunderstorms does not end with the preflight briefing. It continues with constant inflight weather observations and an open ear for radio weather advisories along the route.

Always study the clouds. They are excellent signposts of the convective air currents that build cumulus clouds.

Air mass thunderstorm cells build up over land during the heat of the day and usually break in the late afternoon or early evening. However, either air mass or frontal type thunderstorms may be encountered at any time. If the storms are scattered, they can generally be circumnavigated horizontally. Trying to climb over, in anything but a high altitude jet, is normally not possible.

Before you decide you can slip under the base of a thunderstorm cloud, remember that violent downdrafts often extend below the base to within 300 feet of the ground in the rain cone.

Destructive hail can be tossed from thunderstorm clouds into adjacent clear areas. Bear this in mind if you're tempted to sneak between thunderstorm clouds.

It's a command responsibility to assign a high priority to weather and ensure that every pilot filing a flight plan has ready access to all the weather information that can be got together . . .

Lightning poses another threat. It is more likely to strike sharp or pointed areas of aircraft, such as wing and rotor tips, elevators, rudders, etc. Theoretically, a lightning bolt should pass through aircraft metal structures without causing damage. But this theory does not fit known facts. Wrinkled, burned and split skin on many varied types of aircraft testifies to the potency of lightning strikes.

How much more evidence will we require to buy the simple fact that thunderstorm flying is a major danger?

Scientific knowledge aside, some accidents come about because aviators sometimes know a lot less about a storm's side effects and its long reach than they think they do.

Do you know, for instance, about the "roll cloud" most storms carry along with them? The roll cloud is generally just ahead of and under a storm, a sign of severe and usually far-reaching turbulence. It usually extends downward from the main base. This cloud is caused by the agitation between a rapidly rising current in advance of the storm and a strong downdraft coming out of the storm. Its appearance indicates very rough weather within the storm.

Aircraft, especially light ones, should avoid this roll cloud. It has the power to hurl an aircraft into the thick of the storm. Also, it's unwise to try to fly under this cloud. Sudden changes in wind direction and speed set off by the roll cloud may change flying conditions and flight altitude so rapidly that the aviator may not be able to maintain control.

Unwary aviators who don't know about the roll cloud—*which isn't always visible*—have been known to try to avoid a storm by hedge-hopping under it. They've also been known to have been flattened for the count by the turbulence they whammed into long before they thought they were close enough to a storm up ahead for it to reach out for them.

That can be a long way, up to 20 miles or more depending on the size of the storm. When you consider that an aircraft and an oncoming storm can narrow the gap in a matter of minutes, an unprepared and unwary pilot can find himself in deep trouble too late to execute a 180-degree turn.

The safest course is away from the thunderstorm area. Better go a few miles out of your way or land and wait it out instead of taking the shortest and most direct route, if the course is through the storm area. Lowering ceilings and rainshowers may indicate thunderstorm activity. Don't be duped by gentle winds and rain and fly into the teeth of a thunderstorm, even if you do have an instrument ticket. Losing a rotor or tail boom can spoil most of your day. Another factor that gives warning of approaching a thunderstorm is excessive radio static—a sure sign of a thunderstorm in the area.

It's a case of when in doubt, turn about for the pilot trying to assess a doubtful weather situation up front. That patch of peaceful clouds ahead which look about as harmless as shaving cream can turn into a formidable thunderstorm before your eyes. The light turbulence you are getting now can whip up into a terrific force in a very short time span. A towering cumulus can become a raging thunderstorm in 10 to 15 minutes. When this happens—write this down somewhere and read it over from time to time—once you are in the middle of the stew pot *the 180-degree turn is out of the question.* Your only course is to observe the following procedures, evolved from research and operational experience.

• Reduce forward speed to minimize the effects of severe turbulence and buffeting on the aircraft. Going too fast will cause structural damage to the aircraft because of the gust loads that will be en-

countered. In fixed wing aircraft, too slow a speed will cause the pilot to lose control of the aircraft. The dash 10 gives the best penetration speed for each aircraft. If it doesn't, figure the best to be about 20 percent less than normal cruising speed.

• A slight increase of operational rpm will make the blades more rigid and increase the stability of the rotor system.

• Check cargo and notify crew and passengers of the possibility of encountering severe turbulence.

• Lock your shoulder harness and notify crew and passengers to do likewise.

• Disengage all ASE equipment.

• Turn off all radio equipment that is not absolutely necessary.

• Have anti-icing equipment and pitot heat on.

• If on a night flight, turn up all cockpit lights so you won't be blinded by lightning flashes. If practicable, wear dark glasses.

• Avoid unnecessary maneuvering. Be gentle and easy on the controls.

• Concentrate on maintaining a level attitude. Do not attempt to correct for altitude gained or lost from up or down currents, unless it is absolutely necessary to clear obstructions. Do not "chase" the air speed but attempt to maintain the same attitude to avoid confusion arising from the air speed indicator's fluctuations and errors.

• Fixed wing aircraft should be cleaned up as much as possible to make them respond quicker when extra speed is needed. Retractable landing gear should be retracted. However, the landing gear can be lowered to slow the aircraft when reduced speed is needed. The gear should be raised again as soon as the correct speed has been reached.

• Wings of the aircraft should be kept as level as possible to aid in maintaining a heading.

• The best altitude for entering the storm is about 4,000 to 6,000 feet above the terrain. This is high enough to take care of the downdrafts and yet keep the aircraft out of the high-speed gusts found higher. At 10,000 to 12,000 feet hail and ice are usually found, so these altitudes are very dangerous. There will be considerable lightning flashes. The outlines of the main cells can be seen and it's best to avoid them.

• Due to high, unpredictable, gusty surface winds —in addition to the hazards of hail, rain and poor visibility—never try to land or take off if a thunderstorm is near the field or close to your takeoff or approach path.

AFTER FLIGHT IN THUNDERSTORM OR TURBULENT AREA

• Consider precautionary landing based on severity and resultant damage from flight in turbulent air.

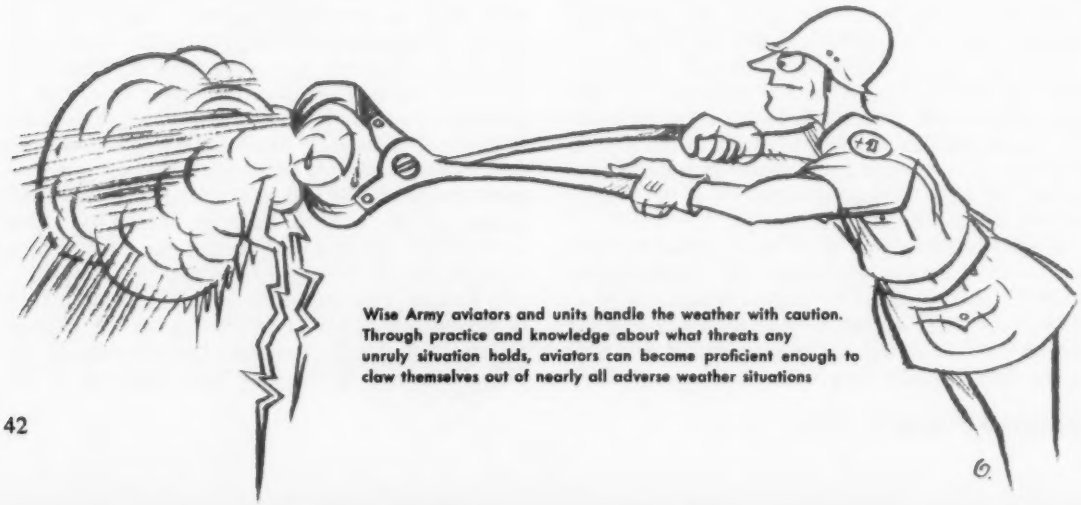
• Make immediate inflight pilot report to both air traffic control and military metro if possible. You may save another pilot a great deal of trouble.

• It may be desirable to perform a check at altitude for handling characteristics of the aircraft in the landing configuration. *Do not permit aircraft to stall.* If runway length and other conditions are satisfactory, consider adding a few knots to normal approach air speeds.

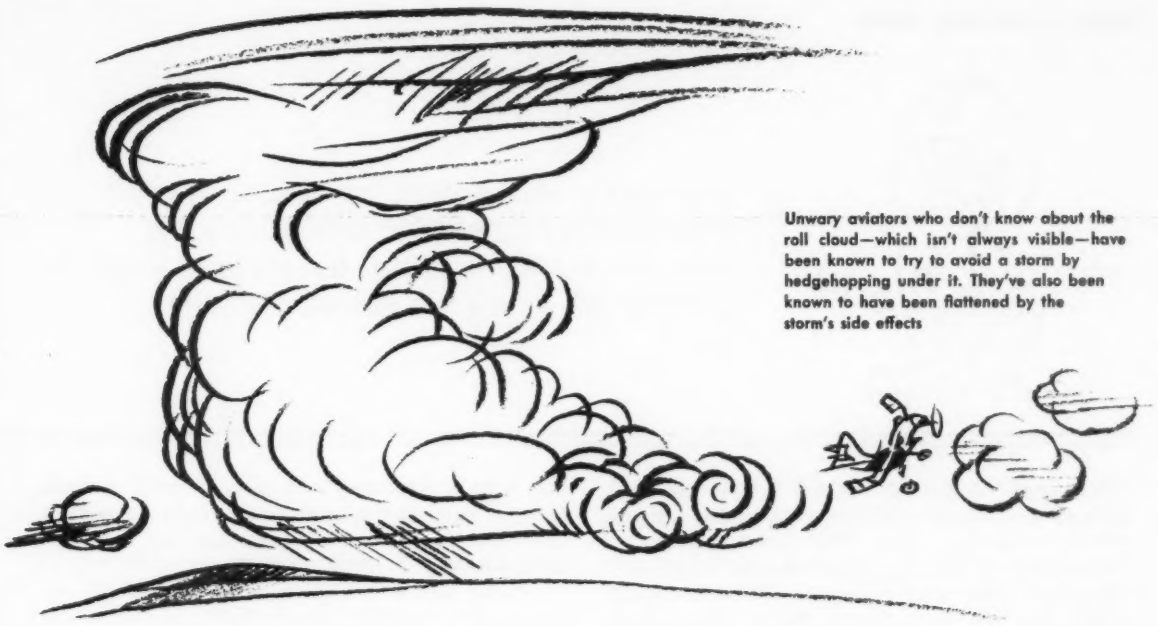
• Write up the incident in the DA Form 2408-13 and request a complete check of the aircraft by a qualified maintenance activity. Your judgment is the deciding factor in determining the need for this step.

• Debrief weather forecaster on location and extent of storm.

It's better to give thought well in advance to the fact that any thunderstorm is a mean animal—and a prudent man gives mean animals all the room he can spare and then some.



Wise Army aviators and units handle the weather with caution. Through practice and knowledge about what threats any unruly situation holds, aviators can become proficient enough to claw themselves out of nearly all adverse weather situations



Unwary aviators who don't know about the roll cloud—which isn't always visible—have been known to try to avoid a storm by hedgehopping under it. They've also been known to have been flattened by the storm's side effects

GRIM REAPERS

Storms and the violent turbulence they generate are the No. 1 Public Weather Enemy in any aviator's book, and the name of the game for anyone is to learn how to recognize them and act accordingly.

Storms can be, and usually are, violent, but even when they are in a gentler mood, weather can give an aviator all the trouble he's asking for and more than he needs. Extremes of heat or cold, for instance. Flying in the Far North regions where cold and snow are the normal order of the day produces problems of icing, snow, fog, vertigo, disorientation and a variety of other hazards a man circling over Fort Rucker in mid-July isn't likely to run into. Even ordinary run-of-the-mill clouds can cause IFR conditions which can give an unprepared crew a tough time. Mountain work often has to be done with another kind of turbulence—rough air caused by currents flowing over peaks and through valleys. Sudden rain and just as sudden a need for a switch to IFR can be a real problem. There are any number of other weather peculiarities in which various localities around the world take a kind of gloomy pride, the way farmers in Kansas feel about cyclones.

Every competent aviator knows that the weather is not to be taken lightly. Yet weather still plays a large part in Army aviation accidents. *What is more and worse, a weather-induced accident usually isn't the kind you walk away from.*

On the evidence, it looks as if some aviators have learned all about the weather but they haven't really given it the respect it deserves.

Here's a good place at which we can start *doing* something about it.

IFR OPERATIONS

Some helicopter pilots, when considering the whole business of IFR operations, will say that IFR training is useful, sure, but not really necessary. These are the same people who won't believe you if you tell them an untrained pilot in an inadvertent IFR situation has a life expectancy of no more than 2 minutes unless he gets outside help.

Inadvertence is a big and ominous word when it comes to IFR flying. Even a relatively trained crew isn't immune to its effects. Some time ago a CH-47 was headed for home shortly after sunset. The weather didn't appear to offer any problems. Ceiling 2,500 feet, the forecast said. Visibility 7 miles. A few light snowshowers. No sweat; no sweat until a dense cloud which came seemingly from nowhere engulfed them. In the next 50 seconds or so they went through an experience none is likely to forget in a hurry, and you won't find a bunch of more ardent disciples of IFR training and practice anywhere in the Army.

What happened was that the aircraft commander, a CW2, who had 426 hours and was instrument rated, made an immediate decision to execute a 180-degree turn. Where he went astray was by violating

UNRULY WEATHER SENSE

It's a case of when in doubt, turn about for the pilot trying to assess a doubtful weather situation. You follow the no-nonsense doctrine that you never accept a weather risk if there is a workable alternative

Golden Rule Number One in the IFR book—he tried going on instruments while shooting glances out the window at the same time. With power reduced, he inadvertently zeroed the air speed and the aircraft fell straight down like a dead duck. Unlike most such stories, this one has a happy ending. The CH-47 dropped out of the cloud with sufficient altitude for control to be regained and in time to avoid a mountain which was looming up dead ahead.

But the aircraft received substantial damage. What with popped rivets, wrinkled skin and structural members bent like pretzels—grim proof of the excessive torque loads—damage came to $190,000.

Both the pilots were instrument rated, as you recall. How come, then, that all this happened? Well, remember also that it took place in just under 1 minute. Faced with the unexpected, with a situation they had inadvertently got into, the pilots' training deserted them because they had grown rusty through lack of practice and because they had not developed agreed-upon procedures to take care of just the sort of emergency they found themselves faced with. If, when they entered the cloud the aircraft commander had immediately concentrated on instruments, as per iron-clad agreement, while the pilot monitored the instruments and reported on conditions outside, the whole hair-raising episode wouldn't have occurred.

It's a fact that you can't always count on every day being as clear as hand-blown crystal. Marginal weather flying is a burden Army aviators must carry around with them daily. The load becomes a little less wearisome for savvy flyers who have arrived at the sound conclusion that the way to tackle a problem is to accept it as a fact and learn how to deal with it.

High-gloss professional polish is what is needed. If you are not prepared, if you lack the real professionalism of the true flying man, it might be a good idea right now to write back home to see if that old job you were once offered in the hardware store is still open. You'll live a lot longer that way.

LET'S DRINK TO THAT

There's an old college boozing song which advances the interesting theory that it is always fair weather when stout fellows get together.

How true! Amen!

If a group of convivial chaps put away enough tankards of rum punch they'll soon forget that the snow outside is piling up to the eaves, but that's another kind of good weather.

Dealing with the weather in more hard-nosed and practical terms is likewise a matter of a number of stout fellows getting together. There is the teamwork which the crew of the CH-47 so badly needed, as one sterling example. There is the leadership, part of every sound unit management program, which ensures that every pilot filing a flight plan has ready access to all the latest weather information that can be got together and that every aviator keeps his weather guard on full alert at all times.

In units where a tip-top management program assigns a high priority to weather, the safety officer is relentless in his efforts to drill into all the aviators the respect it deserves. He takes it as a personal insult if a pilot tells him men flying helicopters don't really need instrument tickets; not only do the pilots have their tickets but they work on their proficiency under the hood whenever possible.

Their helicopters' instruments are periodically checked, including the radio, and if any is found faulty, the aircraft is red X'd as far as IFR or marginal weather flight is concerned.

Everybody is informed as to what IFR facilities are available in the area.

Weather information is kept up to date. What's

more, the pilots are so thoroughly conditioned mentally about weather hazards they never fail to use the data posted.

Seasonal weather briefings prior to significant changes in weather patterns are made standard procedure.

What it adds up to is that everybody is an active participant in a kind of constant weather watch based on the sound assumption that the weather is as changeable as a young girl's heart. When there is a

The way to tackle a weather problem is to accept it as a fact and learn how to deal with it

weak link in the defenses, somebody is going to get hurt, or worse. Look at the case of a U-6 Beaver pilot, following a flight plan at 9,000 feet, who gave a position report and received back a severe weather warning. Nobody to this day knows exactly what went on in his mind. All that is known for certain is that he went ahead anyway and his aircraft was literally torn to bits by the storm he got into. Would it be unfair to suspect that lack of a sound weather management program helped bring about an end to what had been a promising career? If he had been given enough respect for the utterly deadly qualities of thunderstorms to make him turn back, or if at the least he had plotted the alternate route, which possible marginal weather conditions made highly advisable, he would be with us today, hale and hearty.

It is clear that weather has no respect for experience or ratings, or sympathy for the inexperienced and unqualified. Those who venture into it and commit the errors of (1) trying to get through or under its most severe forms; (2) trying to fly contact in instrument weather; or (3) trying to fly instruments without training and qualification must be prepared to pay the high price weather demands.

Some who survive weather accidents use the term "inadvertent" to describe how and why they flew into weather hazards without adequate preparation or qualification. If *you* accept this explanation, the word will make *you* an excellent epitaph.

A weather-induced accident usually isn't the kind you walk away from.
During a recent 12-month period the Army experienced 155 weather-related mishaps, resulting in 133 fatalities

PEARL'S

personal equipment and rescue/survival lowdown

Maintenance and Inspection of Pneumatic Life Rafts and Life Preservers

Dear Pearl:

Due to the location of our aviation unit, we have a unique mission in that the major portion of our operation involves extensive overwater flight in UH-1 aircraft. For overwater survival equipment, we are presently using the LPU-2 life preserver and individual survival kit (one-man raft). However, we are expecting delivery of the improved MK-2 life preserver, 4220-630-1463, and MK-2 life raft, 4220-245-7751, which will fill any projected needs and complete our survival equipment inventory.

Here is our problem! Apparently the Army has not given much thought to overwater flight in rotary wing aircraft, or, if it has, the pertinent information is hard to come by. Our life preservers and rafts now are being repacked and tested by the Air Force using the criteria. I have not been able to find an Army publication or local directive which dictates the inspecting, repacking and testing of this equipment.

Perhaps you can help us out. When our new equipment arrives, it will require packing, inspecting and testing prior to use. We would appreciate any light you can shed on this subject and some hints on setting up a training program for using this equipment.

WO1 John R. Bauguss
Co. A, 25th Avn Bn
25th Inf Div
APO SF 96557

Dear Mr. Bauguss:

Your interest in aviation safety is appreciated. It is suggested that you refer to TM 55-1500-204-25/1, dated April 1970, with change 4, Chapter 1, section VI, "Maintenance of Survival Equipment," contains instructions covering maintenance, inspection, testing and repair of pneumatic life rafts and life preservers.

Presently, the U. S. Army Aviation School at Ft. Rucker, AL, conducts a familiarization course in overwater survival techniques. This course consists of classroom work in familiarization with and operation of existing life support equipment. It is taught as a part of the Survival, Evasion, Resistance, and Escape Course given to the students of the primary and rotary wing courses. This course is not adequate in that it is limited to familiarization. This is evidenced by inquiries from the field for information as to where overwater survival training may be obtained. The U. S. Army Agency for Aviation Safety (USAAAVS) is coordinating with the Survival Training Branch of the U. S. Army Aviation School, U. S. Navy and U. S. Air Force about their water survival training. Additionally, USAAAVS is looking into the feasibility for appropriate Army personnel to attend the water survival schools of the sister services. Until more detailed information can be furnished, I suggest that you obtain the lesson plans of the familiarization course, which can be used as a guide in establishing your unit training program, by writing to: Commander, U. S. Army Aviation School, ATTN: ATSAV-DGS (SERE Branch), Ft. Rucker, AL 36360.

Pearl

(Editor's Note: The U. S. Air Force has a Tactical Air Command (TAC) Sea Survival School at Langley Air Force Base, VA, to train commissioned or warrant officer Army aviators or enlisted crewmembers on flight status in overwater survival. This is a 5½-day school and is normally available to the Army during the months from April through September. Quotas are allocated to HQ, USCONARC, by HQ, TAC (DPCM-T), Langley AFB, VA, for suballocation. TDY travel expenses are the responsibility of the unit to which the individual is assigned. Each student is responsible for his special clothing and equipment required by the school.

The school provides instruction in the proper use of all personnel equipment, flotation equipment and accessories in the Air Force inventory. It also provides instruction on personal health, foraging at sea, and poisonous, ferocious, edible and nonedible fish and mollusks. Also included are firing of pyrotechnics, individual demonstration of prowess of canopy release while being dragged through the sea, disentanglement of suspension lines, inflation of single and all multi-man rafts, navigation course in six-man raft, helicopter pickups and a simulated evasion problem. For further information, refer to Change 73, DA Pamphlet 350-10, dated 20 September 1971.)

USAASO Sez

The U. S. Army Aeronautical Services Office discusses

AN/FPN-40 Radar Sine-Cosine Potentiometers: Reports from the field reveal a high failure rate for sine-cosine potentiometers in the AN/FPN-40 radar set. The problem is attributed primarily to condensation taking place within the "pots." Dirt and dust are other contributing factors in the high failure rate. A good fix is removing the "pots" for periodic cleaning. They are easily removed and disassembled. For installations not operating the AN/FPN-40 on a 24 hour schedule it would be advantageous to remove the pots and store them in a dry place during periods of nonoperation or to provide some form of heat to keep them dry.

Certification And Rating Of Controllers: A brand new controller right out of school has to wait 6 months before he can be facility rated. Right? Right on! Okay, but when does the facility chief start counting for that 6 months. AR 95-37, paragraph 2-3b, says "Individuals who have not been previously facility rated will have six months to qualify for a facility rating. In all cases, time limitations for administering facility rating examinations will meet the requirements of FAR 65." FAR 65.39 says ". . . an applicant who is a member of an Armed Force of the United States meets the requirements of this section if he has satisfactorily served as an air traffic control tower operator for at least six months."

Now let's add some confusion factors. A student at the ATC School must have passed the five part control tower operators written examination before he/she can start training at the stage field, controlling live traffic. This is true for all three specialties—tower, GCA or approach control.

Still don't know when to start counting that six months? Well, it's hidden in there somewhere —and we guarantee to make it crystal clear in our next change to AR 95-37.

Oh yes! To meet the requirements of AR 95-37 and FAR 65, the 6 month period that a brand new controller must serve prior to being facility rated commences—ready?—on the date he/she passes the CTO written exam. This will be entered on the record of grades and in the student's training record.

Low Altitude Approach Procedure Charts: The official procedure amendment number is being placed on U. S. Army and Federal Aviation Administration (FAA) approach procedure charts as time permits. This appears in the top left portion of the chart outside the neat line. When a procedure is routinely amended an official amendment number is assigned. For example, FAA or Army may change a procedure (amdt. 4) for operational reasons. An associated change number (amdt. 5) is assigned. Because DOD FLIP is published every 28 days the new data does not appear on the approach chart until the next publication date. At this time the new data is charted and the amdt. 6 location note is applied. Also, NOTAMs may be used to update procedures. When necessary and to identify the appropriate procedure or chart the NOTAM will contain the amendment number of the procedure to be changed. If the NOTAM action is of a permanent nature, a new procedure will be published and noted with the appropriate amendment number. A typical NOTAM or Army Flight Information Bulletin (FIB) notice using this media of administrative control to reflect a visibility increase would appear as follows: POD (Podunk AAF): SIAP VOR Rwy 27. Amdt. 5 CAT A vis 1.5 NM UFN. When the chart is changed to reflect the increase on visibility an amdt. 6 note would appear thereon. The associated NOTAM, FIB or AIM, part III, notice of the change would be withdrawn.

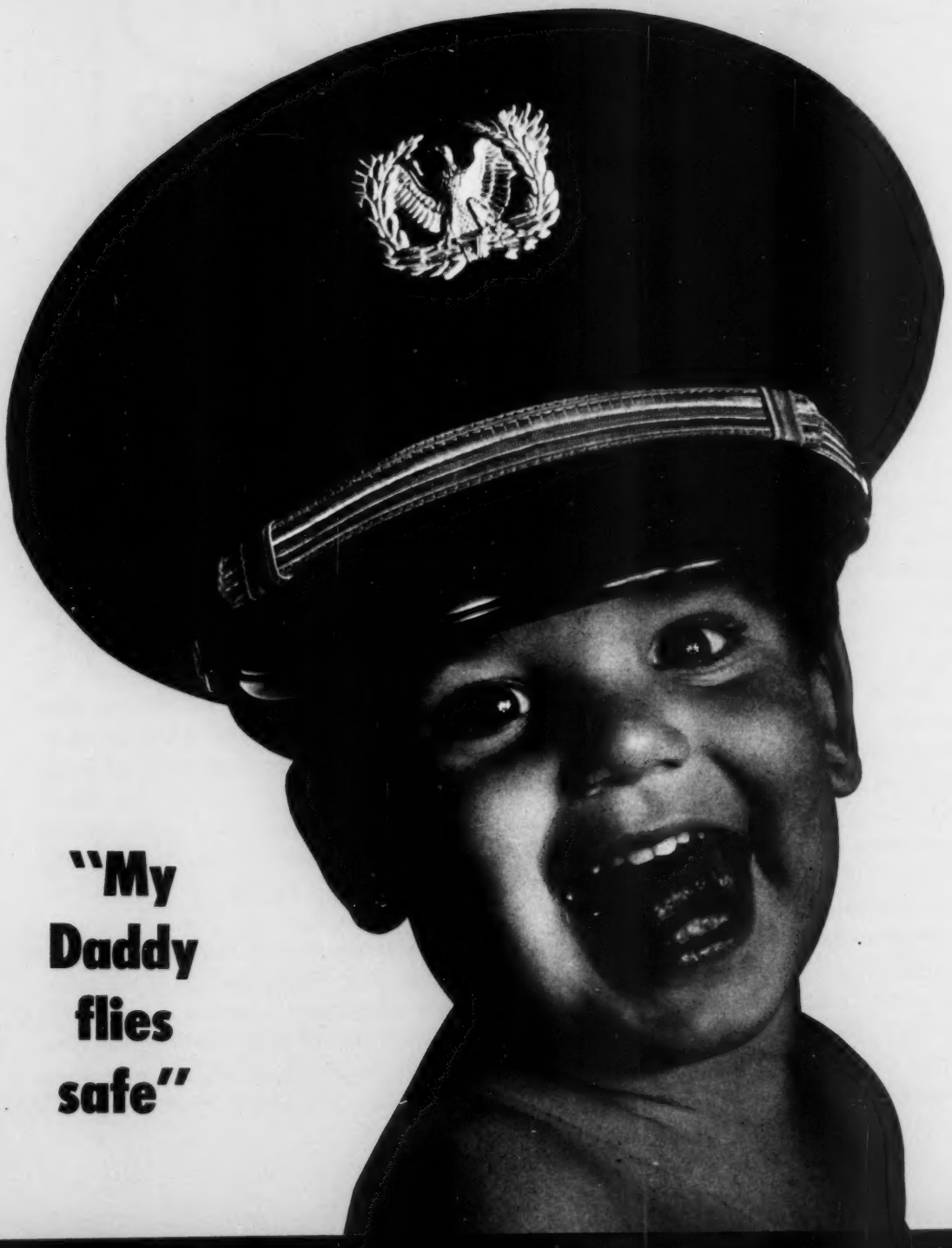
☆ U.S. Government Printing Office 1973—746-161/5

Orval Explains Our Emblem

The United States Army Agency for Aviation Safety emblem is a visual conception of the USAAAVS mission: the enhancement of the U. S. Army's combat effectiveness through the conservation of aviation resources. The primary effort to conserve aviation resources involves a worldwide aviation accident prevention program.

Aircraft accidents and incidents may be a function of either the man, his machine and the environment in which he operates the machine; or they may be a function of any two, or of all three. The stylized human figure silhouette in the emblem represents the Army aviation man. The airplane and helicopter are the two basic types of aviation machine he operates and maintains. An artistic allusion to a sinusoidal map of the world, the ellipses also suggest the intersection and union of the sets of man, machine and environmental cause factors that USAAAVS specialists must analyze to pinpoint cause-and-effect relationships in aircraft mishaps. The blue of the ellipses and the gold of the silhouettes represent the Army aviation colors as authorized by the Institute of Heraldry. A part of the color spectrum common to Infantry blue and Armor yellow, these colors bring to mind the primary combat users of Army aircraft, Infantry and Armor. The sound "save" in the pronunciation of the USAAAVS acronym (u-saves) connotes the conservation, or saving, of aviation resources.

In any interpretation of symbolism, symbolic meaning reflects the sum of the interpreter's experience, and this expression is a verbalization of what the emblem symbolizes to me, the chief advisor on matters of aviation.



"My Daddy flies safe"